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ABSTRACT

This document provides a synthesis of the final project reports and project evaluations of a series of health and education satellite experiments designed to explore the use of satellite technology in the delivery of social services. Each summary in this paper outlines the objectives, procedures, instructional or medical content, and the overall results of the project. A review of the external evaluation provides information regarding areas assessed, such as achievement, and attitude toward the approach by users. An overview section analyzes the value of the experiments as a group, with special attention to their role as precursors of a number of activities started in order to exploit satellites in the delivery of social services. Geographic areas covered include the Appalachia Region, the Rocky Mountain Region, and the Alaska Region.

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A Synthesis of the Final Reports and Evaluations
of the
ATS-6 Satellite Experiments
in Health, Education, and Telecommunications

by

Robert T. Filep and Patricia A. Johansen

February, 1977

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Precis

This document provides a synthesis of the final project reports and project evaluations of a series of health and education satellite experiments. These activities were designed to explore the use of satellite technology in the delivery of social services.

The satellite employed was the National Aeronautics and Space Administration's (NASA) experimental Applications Technology Satellite-6 (ATS-6). The social experiments which commenced operation on ATS in 1974, and continued through 1975, were called HET for Health/Education Telecommunications experiments. HET was a joint project of NASA and the Department of Health, Education, and Welfare.

The experiments provided a large-scale test of the potential of communication satellites for the delivery of social services and enhanced the development of public awareness and receptivity to such activities, particularly their use in remote regions. They also developed a cadre of trained and experienced personnel, for national and international use of communications technology, and acted as a catalytic force for new endeavors in satellite applications. Actual conditions and constraints rendered them demonstrations, more than experiments.

Each summary in this paper outlines the objectives, procedures, instructional or medical content, and the overall results of the project. The review of the external evaluation provides information regarding areas assessed, such as achievement, and attitude toward the approach by the users. Commentary is also provided regarding aspects of the experiments and evaluations.

An overview section analyzes the value of the experiments as a group, with special attention to their role as precursors of a number of activities started in order to exploit satellites in the delivery of social services.

Geographic areas covered include the Eastern experiments in the Appalachia Region of the country that involved education and Veterans Administration applications. The experiment in the Rocky Mountain Region focused on education, the Northwestern region on medical endeavors, and the Alaska projects on both medicine and education. Personnel from many walks of life were involved: professionals such as physicians, teachers, nurses, and engineers, regional, state, and local officials; rural and urban citizens and many school children.

The final reports and evaluations are extensive and generally rich and dense in content. This paper is to provide the policy makers and others, both in the United States and abroad, with a synthesis and commentary on the projects and the evaluation activities.

Attention to technical equipment operation and performance, and to cost factors, is not the concern of this report. These data are reviewed in other AID documents. A bibliography of the major final reports and evaluation studies is provided.

TABLE OF CONTENTS

Introduction and Overview	1
<u>Overview of Experiments/Demonstrations By Region</u>	
Alaska Education and Health Demonstrations	8
Education Demonstration	9
Evaluation Report	19
Indian Health Service Demonstration	23
Evaluation Report	27
Washington-Alaska-Montana-Idaho (WAMI) Experiments in Regionalized Medicine	
Medical Education Experiments	29
Evaluation Report	33
Rocky Mountain Educational Project: Satellite Technology Demonstration	
Education Demonstration	39
Evaluation Report	50
Appalachian Education Satellite Project	
Education Demonstration	57
Evaluation Report	62
Veterans Administration	
Health Experiments	65
Evaluation Report	70
Footnotes	72
Bibliography	73
Appendix	78

INTRODUCTION

Policy makers and others, both in the United States and abroad, are herein presented with an overview and analysis of a series of field experiments that were designed to explore the use of satellite technology in the delivery of education and health services.

To assume that these experiments were designed years in advance of the availability of the Applications Technology Satellite, Number 6 (ATS-6), would be incorrect. Rather, they developed rapidly as a consequence of the sudden attention directed toward the use of space technology in the social sector. Limited time was available for planning and development of acceptable experimental design and control groups. The selected satellite further limited flexibility as it was in the final production stages and did not allow for significant modifications. Therefore, the development of program content in the area of social services required adaptation of the experiments to technical constraints. In spite of the restrictions experienced in initiating these experiments, they do provide excellent case studies of satellite technology use.

Prior to the ATS-6 experiments there had been minimal application of satellite technology to health, education or other telecommunications programming, either in the United States or elsewhere in the world. Attention was centered in Alaska on a small range of experiments utilizing the ATS-1 and ATS-3 satellites and their radio capabilities. But the inherent capacities of these satellites were limited when compared to the scale of ATS-6 with its television and radio capabilities and its potential for interactive activities. The ATS-6 was also the first communication satellite to have enough power to transmit to relatively small and inexpensive ground stations.

The initial involvement of the Department of Health, Education, and Welfare (HEW) in 1970 was supported by those who saw an opportunity to test the satellite's engineering capabilities and its acceptability for the delivery of social services. As the broadcast regions became aware of and interested in the availability of the satellite, additional goals were developed. Some grew out of the needs of a particular region and included social, political, and economic objectives. Other goals, particularly those dealing with content of television programs for broadcast, emanated

from priorities of the agencies within HEW which had funds for such endeavors. These included, for instance, the program areas of career education and early childhood education which had money to support the personnel and programs needed to conduct the "experiments."

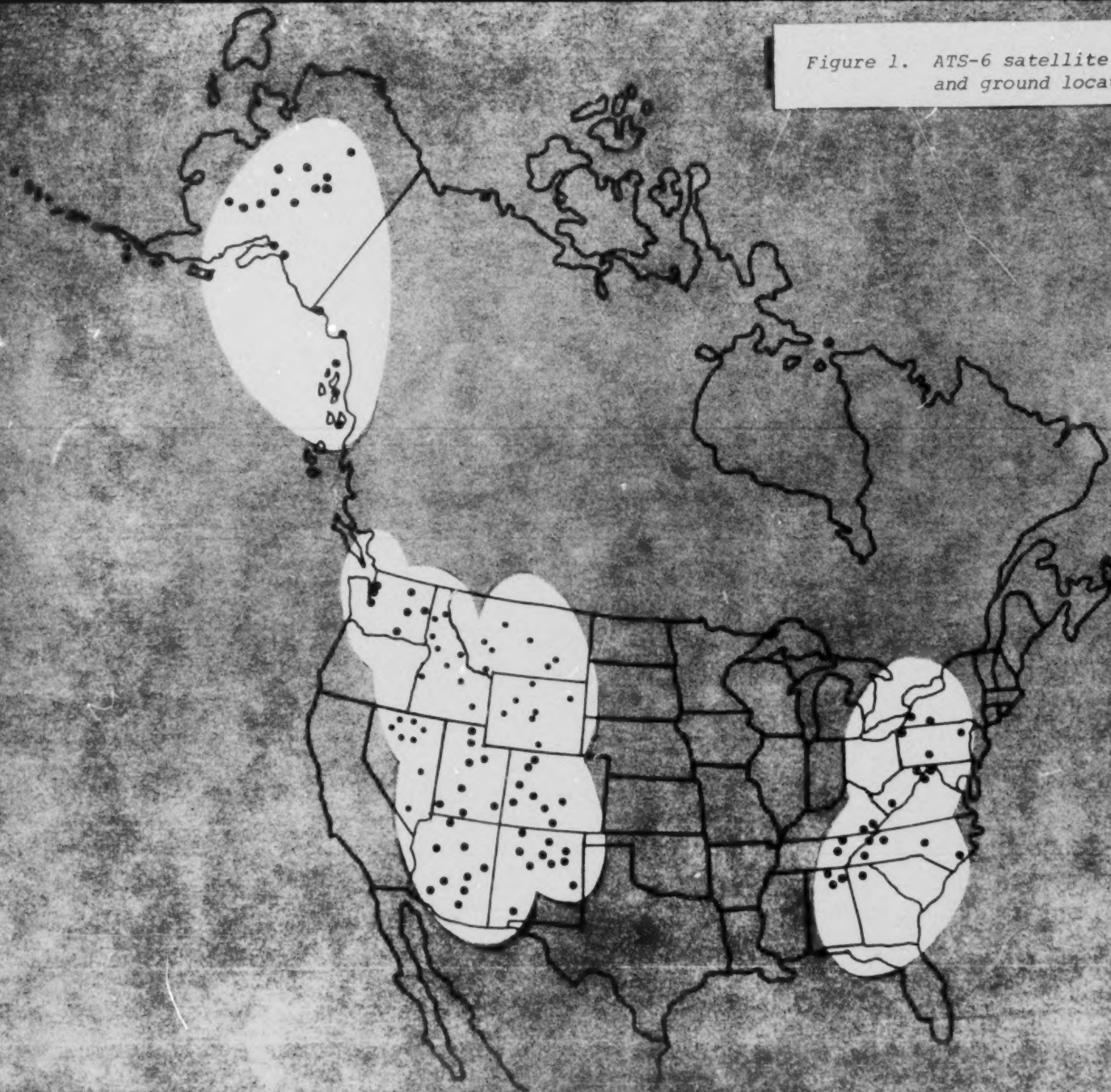
At the time, the National Aeronautics and Space Agency (NASA) wished to remain in the role of "experimenter" and not to be perceived as starting a series of government satellite applications projects which could be interpreted as being in competition with rapidly developing commercial satellite endeavors.

Figure 1 indicates the approximate areas of the satellite's footprint (broadcast beam) when it was operating in the Eastern, Western, and Northwestern sections of the United States. The satellite was directed by the National Aeronautics and Space Agency (NASA) to beam first to the East Coast, then to the Far West and eventually to the Northwestern sector. Due to the differences in time zones each region was able to use the capability of the satellite receiving and transmitting stations during a "normal" working day.

INSERT FIGURE 1 ABOUT HERE

Personnel in the Rocky Mountain region provided the impetus for the entire series of experiments and had the leading role in the equipment and satellite communication responsibilities. The health experiments, although not as large or extensive as the Rocky Mountain endeavor, were committed at an early stage by the health agency and the personnel in the field. The Appalachian education experiments followed, then came the Veterans Administration projects, and finally the Alaskan education experiments were approved. NASA played an important role in coordinating the technical aspects of the experiments, since the social services endeavors were one of a group of twenty experiments being conducted via the satellite. The other experiments involved technology and engineering concerns such as television and radio frequency interference tests, spacecraft positioning, thermal control, environmental measures, and weather experiments. An overview of all ATS-6 activities is provided in NASA/FACTS listed in this

Figure 1. ATS-6 satellite "footprints" and ground location (approximate).



document's bibliography.

To conduct the experiments and coordinate the activities in each region, NASA and HEW set up a monthly planning activity in which all participants met to discuss mutual needs, requirements, etc. The Federation of Rocky Mountain States was responsible for providing engineering assistance to the other regions in getting ground terminals installed and for providing engineering support.

In the HEW experiments, the ability to use the voice interaction capability of the ATS-1 and ATS-3 satellites, which were in operation, was a last-minute compromise between the users and NASA. The original agreement, as understood by the public-sector users, was that NASA would supply both a broadband (TV) and a narrowband (radio) format aboard the ATS-6 spacecraft. However, time and interagency differences about the use of specified frequencies prohibited the use of the planned narrowband interactive applications for ATS-6 and, consequently, forced the use of the limited channel capacity of the ATS-1 and ATS-3 satellites. Therefore, capabilities of three satellites were employed in aspects of these experiments.

While this change somewhat limited the scope and outcomes of the demonstrations, in retrospect, the demonstrated potential of narrowband--in its proper perspective--ironically could be an important finding of these experiments.

Although the ATS-6 experiments have individual goals, they are inter-related. The body of this document views the nature and evaluation of each activity, based upon the final project reports, the evaluation reports, and comments from the principals in each study. The senior author has also drawn upon his early involvement and continuing contact and interest in these projects. In the main section of the document the unique outcomes and shortcomings of each project are of concern.

The following overview section attempts to analyze the importance of the experiments as a group, with special attention to their role as precursors of a number of activities relating to the use of satellites for the delivery of social services.

OVERVIEW

If the question were raised, "Did these projects make a difference?",

the answer must be, "Yes." The variety and diversity as well as the importance of activities and results reported in the pages that follow cannot be dismissed. There are specific outcomes and caveats that pertain to a specific educational or health delivery experiment conducted in a region, but these do not restrict the overall significance. Of course, the results and guidance for the reader must be interpreted in light of the unique conditions in each area.

The experiments did provide the following:

- The potential of communication satellites for the delivery of social services was tested on a large scale.
- The experiments enhanced the development of public awareness and receptivity to such activities, particularly such use for remote regions.
- A cadre of trained and experienced personnel became available for future national and international use of communications technology. Countries which have benefited directly to date include among others India, Indonesia, Iran, and Japan.
- The experiments served as a demonstration of how federal, state and local agencies can work together on complex technological, political and social projects.
- A clear understanding that the full-capacity of the video, audio and interactive elements of the satellite system had not been exploited.
- A catalytic force for the establishment of a Public Service Satellite Consortium and a Public Interest Satellite Association directed toward further serving citizen needs through communication satellites.
- A potential market whereby manufacturers of ground receivers and other equipment could invest in and evolve low-cost equipment and service for social service users.
- A demonstration that only minimal training was required by men or women to successfully use receiver and transmitter equipment in remote areas.
- Identification, particularly in the Alaska demonstration, of how consumer committees might be involved in the definition of the system's use and also of what courseware and activities would be most useful in a particular

region.

- A demonstration that radio as a teaching-learning tool is far from dead. It would appear that developing countries can still use nationwide radio teaching which is economical and does not require the very expensive use of bandwidth required by TV. The use of radio as a medium for instruction--even satellite delivered--places within the grasp of most peoples of the world a resource which any and all can use.

- A reminder that current spacecraft, now in use commercially, do have the capability of providing hundreds of narrowband or thinline channels which can and could be accessed by relatively inexpensive ground terminals. Utilizing such a capability would provide for the dissemination and local access to all types of learning materials for even the most remote of populations and would also facilitate the deployment of scarce national resources such as medical care.

CAVEATS

A number of important ideas emerged from all the experiments and are the specifics that future planners and operators of such activities might consider:

- Additional time should have been provided for planning user needs assessment, establishment of base-line evaluation data, and the development of courseware to be used in the experiments. Additional time for all of the above would have increased the level of success and the knowledge gained from each experiment.

- Establishment of "new agencies" to conduct such activities is, at best, a risky business. Those experiments which seemed to experience the least amount of difficulty were "inserted" in established institutions or agencies.

- Federal agency guidance and monitoring might best take place by an all parties negotiation of the goals of each experiment, and then a collegio-consultive role by agency personnel--as contrasted to an adversary role. Frequent, at least monthly, meetings of all components and agencies (space, courseware, technical utilization, etc.) involved in the experiments seem imperative for successful communication, coordination, and operational

success.

- Using telecommunications in remote regions can have economic and cultural gains. For instance, keeping patients in their own village while prescribing treatment by long distance may far outweigh the combined difficulties of transportation to a central source where personnel, context, etc., are strange to the individual and the cost of transportation must be added to the cost of health care.

- Interactive capabilities seem to portend a greater success in areas such as health delivery or specific interactive education endeavors. They should not be viewed as the panacea for all communication satellite experiments.

- Consumer involvement and program development for such experiments must have a quality level that will engage and not disappoint viewers. Although the expense of commercial quality courseware is not required, high quality is desirable. Education as entertainment is a variable that must also be considered when developing such programs.

- Logistical vs. educational or informational transmission should be weighed as separate issues. Some things can be taught less expensively than with satellites as the vehicle. The ATS-6 satellite activities did demonstrate the application and acceptance of the technology but they could not be considered experiments in the classic sense, since the scope of the endeavors was too broad, they lacked the necessary experimental controls, and they were operated over a relatively brief period with constraints upon audience viewing time and technical options.

The authors have not attempted to provide all the details that are found in the lengthy and illustrated final reports and evaluation documents. Individuals interested in a specific experiment or a particular dimension (i.e., costs, technical aspects) are encouraged to review the other AID summary reports in this series, to obtain the final or evaluation reports listed in the bibliography, or to contact the principal project experimenters personally.

In the following pages the reader is provided with summary information regarding the experiments, the final reports, and the evaluation studies of each experiment. Authors' commentary as contrasted to summaries are provided in *italic*.

Summaries of each experiment and evaluation have been shared with

principal members of each project for comment and clarification. Grateful acknowledgement is hereby extended to them and to the following for their assistance with aspects of this document: Dianne Bozler, Marion Filep, Candace Janssen, Gordon Law, Myron Smith, and Carol Taylor.

In contrast to the sweep of the ATS-6 satellite beam which progressed from East to West, the reader is provided a reading odyssey starting in the West with the Alaska experiments in education and health, then proceeding to the Washington-Alaska-Montana-Idaho (WAMI) medical endeavors, followed by the Rocky Mountain Education Project, and finally with reports on the experiments conducted in the Appalachia or Eastern region of the United States.

ALASKA EDUCATION AND HEALTH DEMONSTRATIONS

Geographic and Demographic Characteristics

Alaska no doubt faces the most difficult communication problems of any state in the Union. Although it covers an area one fifth the size of the continental United States, it has the smallest population of any state (less than 350,000). Its massive land area (one third of which lies within the Arctic Circle) spans four time zones, claims half the world's glaciers spread through its numerous mountain ranges, contains 19 mountains over 14,000 feet, and over three million lakes.

The extremes of Alaska's geography compound communication difficulties due to the distribution pattern and general inaccessibility of Alaska's small population. Forty percent of all Alaskans live in rural communities of less than 1,000 people. Of the state's 265 villages, towns, and cities, two-thirds have no access to ground transportation. Access to these communities is by air, boat, snowmobile, or dog team--weather permitting.

Some rural communities are served by overcrowded telephone facilities. Radio exists primarily in Alaska's larger cities although 85 percent of the population is in reach of some sort of television distribution system including commercial, public, armed forces, and commercial cable.

The major native Alaskan groups (Eskimo, Aleut, and Indian) comprise 17 percent of the state's population. Numerous native languages and dialects are spoken. Three-fourths of the native population live in small, rural villages where the school teacher may be the prime English-speaking model in the community.

The average life span of the native Alaskan in 1965 was 38 years. Some progress is being made toward bringing health education and preventive health care to remote areas, but the environment is hostile. The health-care delivery system in rural Alaska revolves around local health aides who represent the only link most villagers have with modern medical care. Severe medical cases are transported by air when weather permits. Alaska Native Health Service doctors make the rounds of some isolated areas giving physical examinations and other preventive care.

Until the launching of ATS-1 (which was used experimentally in a rural

medical care project in 1972), HF (high frequency) radio was the primary means of communication to the remote areas. Alaska's unique ionospheric conditions make HF transmission extremely unreliable; for example, HF communication had been less than 20 percent effective in some areas. The ATS-1 satellite test demonstrated almost 100 percent reliability.

The communication problems generated by the extremes of Alaska's geography and population distribution, as well as its linguistic/ethnic composition, make satellites an essential component in the future of Alaska's educational and health-care system. The Governor's Office of Telecommunications (GOT) of the State of Alaska entered into the health/education technology experiments with the view that satellite distribution may be the only feasible method of bringing services to Alaska's isolated communities.

ALASKA EDUCATION DEMONSTRATION

Overview

In an attempt to learn how to design and implement future satellite systems, the Governor's Office of Telecommunications coordinated the development and transmission of about 150 hours of satellite programming for 14 intensive and four comprehensive sites. Most sites were small isolated villages in which Alaska Natives were the primary audience. Programs were developed in five areas with most creative effort going into an oral language development course for four- to seven-year-olds, a health education series for elementary school students, and a topical "magazine" format series for adults. Consumer committees participated in the design and development of most programs.

Background

The primary objectives of the educational experiment were to install and operate an experimental satellite communication system and to gain technical experience with which to plan future systems. GOT saw the experiment as an opportunity to define the goals of a future system and to gain the experience necessary to undertake concrete, informed discussions with potential suppliers so that the state could lead, rather than follow, in the development of needed satellite-based services and equipment.

In addition to technical experience, the GOT saw a need for developing user experience with the capabilities of a satellite system. Many of the

potential users of satellite transmission had little or no experience with modern communication systems. Some villagers have no cultural frame of reference outside their local communities. Before these users could participate in planning for a future satellite communication system, they needed to sample some of the potential products (entertainment, information, education, etc.).

The Alaska education experiment began preliminary work in 1972. Negotiations with the National Aeronautics and Space Administration resulted in a weekly allocation of 4 hours and 45 minutes of satellite transmission time beginning in the fall of 1974 and ending in May of 1975.

Site Selection

In terms of ethnic composition and remoteness of residence, the 63 communities encompassed in the ATS-6 Alaskan footprint (transmission area) did not represent a cross-section of the Alaskan population. However, the selection of the sites for the satellite experiment did focus on the more remote villages because it seemed that they had the greatest need for the technology. Most remote and isolated villages are predominantly Eskimo, Aleut, or Indian.

Additional guidelines for site selection were:

1. Significance of satellite technology in meeting local needs;
2. Populations large enough to develop data about the program (perhaps 250 or more);
3. Interest shown by the potential participants in the community; and
4. Availability of a facility (school or public hall) for installation of equipment and for use by the viewing audience.

Site selection was coordinated with the Indian Health Service which was the medical participant in the health/education experiment. A preliminary plan called for the identification of approximately 35 sites for participation in the experiment. A scaled-down site-selection plan finally established 19 sites, 14 of which were intensive sites with the capacity to receive one channel of video and four channels of audio via ATS-6 and with two-way voice interactions via ATS-1.

The remaining five sites were comprehensive sites, which had the same capabilities as the intensive sites, but in addition, could transmit one

channel of video and four channels of audio. Two of the comprehensive sites (Fairbanks and Juneau) originated educational programming; Fairbanks also originated medical programming. The other three used video transmission for the medical experiments only.

Utilization aides were hired at each site. Their responsibilities included equipment operation, publicity distribution, and data collection.

Needs Assessment and Program Definition

The GOT worked closely with the Alaska Department of Education throughout the planning and implementation of the education experiment. The educational system in Alaska has a tremendous need for face-to-face communication. There are extreme costs and almost insurmountable physical restraints to travel. Small villages have education only through the sixth grade, and children must travel to regional boarding schools to complete their elementary and secondary education. Teachers do not have access to basic materials, or to advanced or in-service training programs, which are considered routine in most school systems. The optimistic goals of future satellite systems include making secondary and college training available in remote areas.

The cooperating state agencies recognized that the feasibility of satellite technology was the major emphasis of the experiment. However, they wanted to focus on user needs even though time constraints and data and funding limitations did not lead to high expectations for significant changes in student and adult audience behavior.

A 1972 Alaska Department of Education study assessing the needs of the Alaskan educational system identified three critical areas that seemed appropriate to the satellite project. These were:

1. basic student communication skills;
2. good health habits and accurate information on sex and drugs; and
3. instruction which recognized differences in learning style and provided more educational options to students.

These educational needs, coupled with GOT's goal of attempting to provide a variety of programs, led to the specification of the following program areas:

1. Basic Oral Language Development (BOLD),

2. Health Education,
3. Alaska Native Magazine (adult topics),
4. Teacher In-Service Training,
5. Experiments of Opportunity (unused ATS-6 time made available to other state agencies),
6. Early Childhood Education, and
7. Public Broadcasting Service (TV) and National Public Radio Interconnect (to provide live, national public-affairs broadcasting to remote sites).

Administrative and funding decisions (and technological problems) caused the elimination of the last two services from the final broadcast schedule. Consumer committees assisted throughout in the definition, development, and production of these programs.

Consumer Committees

The consumer committees for the oral language and health education programs were made up of individuals from each site and from state-wide health, education, and ethnic/cultural groups. Site representatives were selected by the community and usually were active in local organizations. Some were teachers; some were laymen.

In the selection of committee members and in the hiring of utilization aides for each site, the utilization manager of the project faced several problems. Not all selections met with the approval of all groups in the village. Also, written communication is not the normal means of conducting business in many of these areas. Follow-up responses from selected villages were not always forthcoming, and later data-collection efforts were hampered by breakdowns in the written communication system. These problems seemed to decrease as the villagers became more familiar with GOT personnel through site visits.

A consumer committee also guided the development and production of the Alaska Native Magazine (ANM). Members of the ANM consumer committee were selected by the four Regional Native Corporations which were represented in the transmission area. Most of these committee members were prominent, busy people involved in activities all over the state. Most were not rural residents and, therefore, could not always view the programs which they had

helped develop. Programs were replayed at committee meetings, which resulted in considerable delay in committee activities. Committee members were not always "in touch" with the needs of rural residents. Consequently, the input from utilization aides who attended the final consumer committee meeting in March of 1975 was viewed as extremely important in planning future programs.

However, in spite of its shortcomings, the Consumer Committee provides an excellent model for examination by others who are interested in rural and regional involvement in needs definition and on-going project effectiveness.

Program Development, Production and Transmission

Basic Oral Language Development. The BOLD program had two general objectives: (1) to explore the effectiveness of television and two-way audio interaction in developing and improving oral English skills, and (2) to provide training for local aides in the techniques used in teaching oral English skills. Students ranged in age from four to seven. There were 32 programs in the series, and one was transmitted each week. The programming included dialogues, games, and songs. Oral responses were elicited from students, and teachers or aides assisted students and reinforced language patterns.

The agreed-upon program vehicle, a series called "Amy and the Astros," was a combination of human and puppet characters. "Amy" encountered space puppets in an assortment of language producing situations.

Health Education. The health program was to focus on the development of health habits, health attitudes, a good self-concept, safety practices, and knowledge of the body and its functions. Two 30-minute programs were transmitted each week; in all, 64 programs were transmitted. The first program of the week was specifically developed to meet the consumer committee's requirements. The second was made up of pre-packaged materials selected to reinforce the topic of the first program. The target audience was eight- to ten-year-olds. The series, entitled "Right On," involved humans and puppets, and the basic setting was a rural health aide's office. Two programs were "field-tested" using eight students ranging in age from three to thirteen. The younger students seemed to lose interest. After viewing early programs, the consumer committee encouraged more use of puppets and music and suggested that skits be shorter and the pace quickened.

Both the BOLD and health education programs were developed by the

Northwest Regional Educational Laboratory (NWREL) under contract to GOT. Program production was to take place at the studios of KUAC-TV at the University of Alaska in Fairbanks; however, scriptwriting responsibilities were shifted from KUAC to NWREL in Anchorage when coordination of program design and script development proved difficult. *The splitting of the design and production responsibilities between two organizations produced some conflicts which were avoided, for example, in the Rocky Mountain project where program design and production were done by a multi-disciplinary team at one organization. In the BOLD sequences, for instance, the program designer was committed to language teaching techniques which were not dramatically interesting from the TV producer's point of view.*

The 15- to 20-minute, pre-recorded portion of both educational programs was transmitted from Fairbanks. The interaction portion of the two elementary school programs was transmitted live from Juneau. The host teachers reviewed the content of the pre-recorded material and then addressed questions to different sites. The original interaction format of the health education series expected that there would be questions from the student audience. When few were forthcoming, the format was revised to include prepared questions for direction to specific sites. The interaction capability was not used heavily by the students although interest was high when their classroom was questioned. They report that the program may have been too long to retain the interest of younger students. Program attendance for both the BOLD and the health-education programs averaged about 44 students and 3.5 adults per site.

Alaska Native Magazine. The Alaska Native Magazine (ANM) content was determined by the ANM consumer committee and the ANM design and production staff at KUAC-TV, Fairbanks. The basic format of the weekly, one-hour programs included a live host, guests, and on-location filmed or taped footage relevant to the topic. In addition to the basic topic, rural news was provided, profiles of rural people were presented, and time was made available for interaction with hosts and guests.

Some of the early program topics were "Rights and Responsibilities," "Native/Non-Native Cooperation," "Environmental Protection," "Consumer Affairs," and "Native Land Claims." It was hoped that later topics could be

based on local responses to the earlier programs. Since little feedback was forthcoming, the later topics were also determined by the consumer committee.

The committee emphasized that it wanted the program designers to avoid slick formats and bureaucratic language. As experience was gained, the programs moved in the direction of increased flexibility in content and format. For example, the consumer committee encouraged film crews for later programs to go out to sites with an open mind as to what might be of interest. Later programs utilized more film and tape and less panel discussion. Although time and communication problems precluded much advance preparation of villages for the more than 20 filming field trips, the film crews did learn about some operational problems and about the lack of advance publicity for ANM programs. Crew visits invariably peaked interest in ANM at the visited sites. *Throughout the report it is noted that as villages were exposed to project personnel, whether through film crew visits and trips by staff members or through travel of villagers (consumer committee members or utilization aides) to project meetings, interest in the various programs increased and interaction was facilitated. In general, as familiarity with the project, hardware, personnel, and programs increased, the use of the interactive mode increased.*

Material and news for each program were developed into a final script just prior to live broadcast each week. Each program was transmitted in English with simultaneous translations in two native Alaskan languages. (A third Alaskan language transmission was planned, but no competent translator was found.) Each site could choose the audio channel (language) of widest preference. Unfortunately, since only one audio channel at a time was available at each site, viewers who preferred another language were left out. (In practice, according to reports by the external evaluation group, the Alaskan language channels were used very infrequently. Dialect differences, among other things, contributed to the general reliance on the English transmissions.)

As already noted, the interaction mode was not widely used initially by viewers of ANM. Many were intimidated, at first, by the microphone and button-pushing. Some adults felt that the programming moved on too fast--before they could formulate questions. *Increased use seemed to bring confidence. Users have requested interactive capability in future satellite projects.*

According to figures presented in the final report, an average of 17 adults and 12 students per site viewed each ANM program. These figures do not include the extended audience of KUAC-TV in Fairbanks. Many possible explanations for limited attendance were offered. It is clear that aides were not consistently effective in distributing broadcast publicity or in encouraging attendance. It was also suggested that the placement of the television monitors in schools may have been a drawback in some communities where the school was viewed as "foreign" or "authoritarian."

Teacher In-Service Training. The target audience of the in-service training programs included teachers, administrators, and paraprofessionals. Originally only four programs were planned for this series with some program content to focus on ATS-6 orientation and utilization. With the elimination of the early childhood education component and the reduction by half of the BOLD programming, additional satellite transmission time became available. Thirty-two, 30-minute slots were made available for in-service training. Program content was left to the Alaska Department of Education. Program production was handled by KUAC-TV.

Interim programming scheduled a commercially available series of filmed lectures, "Motivating Children to Learn," accompanied by a teacher's manual. Additional Department of Education resources were to be used to answer specific teacher concerns. Participating teachers who developed original projects and materials for transmission/discussion in the series would receive academic credit at the University of Alaska.

The pre-packaged program was not of interest to the audience. No interaction was forthcoming and the one teacher-produced program that was aired was not specifically produced for teacher in-service training.

Final revision of the format included some programs based on teacher requests and the remainder centered around a panel discussion or an interview with a teacher working with innovative materials. Twenty-eight programs were produced in the "Tell and Show" series. The use of interaction was sporadic and remained sparse throughout the series. The audience for each program averaged 1.3 adults per site.

Experiments of Opportunity. GOT solicited program suggestions from other state agencies to fill the remaining satellite transmission time.

These efforts resulted in three program sequences:

1. A 17-segment series developed by the Alaska State Library on "Community Library Training." Communities which were not in the ATS-6 footprint but wanted to participate in the project received tapes of all broadcasts.
2. A 15-segment series called "Politalk" was coordinated by the Department of Community and Regional Affairs and produced by GOT. The series focused on the activities and personalities of the state legislature.
3. A series of 16mm fish and game films developed by the Alaska Department of Fish and Game were also transmitted.

Additional Distribution of Materials. The Alaska Education Experiment received many requests for copies of programs. Commercial cable TV showed interest in transmitting programs over their lines, but coordination and technical difficulties hampered this effort. Copies of programs were distributed at cost to numerous organizations including the Bureau of Indian Affairs, Alaska Native Medical Center, Alaska State Library System, Alyeska Pipeline Service Company, and KUAC-TV. KUAC-TV received permission to transmit the BOLD programs and the health education series over its own facilities in the fall of 1975.

Recommendations

The final recommendations of the experiment seem to fall into three general areas: technical, administrative, and interactive. Recommendations which represent procedures different from those used in the project and which have not already been described in earlier sections of this report are summarized here.

Technical requirements for a communication system of this kind should include:

1. high-quality, two-way radio interaction (the quality of ATS-1 transmission apparently was not satisfactory);
2. videotape recording facilities at all sites for recording and later playback of transmitted programs;
3. simultaneous translation of appropriate programs in languages (dialects) of high occurrence and individual access at each site to all of the translations;

4. audio interaction between sites and, more essentially, an audio channel reserved for technical control and operations;
5. at least two monitors in each village to provide adult and student access to programming; and
6. a state-wide satellite footprint.

Administrative/management recommendations include:

1. adequate lead time for all phases of a project, especially for equipment installations where remote sites are involved and for program design and development;
2. field testing of viewer reactions to programs prior to broadcast; and
3. program development which is coordinated from design through production.

Recommendations about interaction/coordination with the user population include:

1. Sites should decide to participate rather than be "chosen." Participating sites should provide substantial input to local facilities planning, aide and consumer-committee selection, and subject matter delineation.
2. Local educational planning organizations should be involved from the beginning, and the use and technical training of Alaskan Natives in all phases of the project should be encouraged.
3. Local educators who will receive the programs should play a primary role in establishing content and format.
4. Coordination by a central, statewide education organization is needed.
5. Public information is a critical component of user participation and acceptance.
6. When possible, research and evaluators should be familiar with local customs and institutions. Natives have developed the art of letting "outsiders" hear what they want to hear.

EVALUATION OF THE ALASKA EDUCATION DEMONSTRATION

The Alaska education project was analyzed by Practical Concepts Incorporated (PCI) of Washington, D.C.. PCI was under contract to the National Institute of Education to conduct an evaluation of the educational aspects of the satellite demonstration in Alaska. PCI subcontracted some portion of the work to the Center for Northern Education Research of the University of Alaska.

The bulk of the presentation in Volume I, Analysis of the Demonstration cannot be viewed as an evaluation in the usual sense of the word. Rather, it is a political/sociological/anthropological/linguistic/pedagogical treatise looking for a vehicle. It found one in the Alaska project. Results, in the more conventional sense, are reported in a section on user reactions to the Alaska project and their implications for the future. The overall focus of the report, however, is on providing a broad social/cultural/economic context for the rural Alaska political/educational system and for what telecommunications could mean to the system. The recommendations may prove to be important but given the present state of knowledge seem to reflect some preconceived notions on the part of the authors.

PCI returned again and again to a regional (rather than statewide) telecommunication system which should reflect, in some way, the culturally diverse areas of the state. They further proposed that programming should be written and produced by a yet-to-be developed cadre of natives and media specialists.

The problem here is that the rural native population is probably no more than 40 or 50 thousand individuals representing at least three distinct ethnic backgrounds with five languages and 20 dialects. It seems questionable that, even if the technical manpower were available, effective and culturally appropriate programming (especially for television) could be regionally developed or supported. It would appear that in order to produce any more than the interview/lecture type of programming which was generally rejected by viewers in the Alaska project, a program developer would have to seek communality of needs rather than to focus on a limited audience. It is possible that a cost-effective solution lies somewhere in between.

It is obvious that PCI set out to make a strong case for planner sensitivity to the role of subtle social/cultural factors in the design of a viable communication system. They pointed out, in a discussion of their six-stage innovation model, that the first step, Awareness, was neglected in the Alaska demonstration.

They concluded that the elaborate system of consumer committees, which gave at least face validity to user-oriented program development, was ineffective in content decisions--a conclusion which is partially supported by anecdotal data collected from committee participants. The committees' role proved to be one primarily of approving rather than determining program content and format--a result more of the time constraints of the project than of a deliberate attempt to by-pass user input.

In discussions of the rural school system and its slow movement away from state control and toward local control, PCI focused on student wants versus "alien" teachers' perception of student needs. Although differences in learning styles between the so-called dominant white culture and the rural native population should certainly be considered when determining curriculum content, any school system that assigns relevance purely on the basis of provincial expectations would surely fail. It seems just as paternalistic to deny native students educational access to the outside world as it does to insist that they reject their own culture. It would appear that PCI suggested, and these authors would agree, that the consumer committees should be made aware of a range of curriculum alternatives.

It is impossible to begin to summarize in these few pages the extensive content of this remarkable perspective on the Alaska project. The analysis of anecdotal reports of teachers, utilization aides, consumer committee members, and native interviewers (hired to probe community response to the project) is in itself a 120-page outline of results and recommendations. PCI's summary of this section is attached as Appendix A of this report.

A chronology of the critical events which marked the history of the project is included in the second volume of the PCI report. *In total, the two volumes provide a fascinating, if occasionally disjointed, account of the project at a level of detail and insight that may be unique in reports of this kind. It should be invaluable as a planning document for future*

telecommunications systems in Alaska. For the policy-maker looking for guidelines in developing new demonstrations of user-based communication systems, it should be extremely useful. It may not be of great interest to the educator looking for an evaluation of specific program content or results.

A brief summary of PCI's general conclusions may help to establish the tenor of the report. The conclusions are stated as answers to five basic questions.

1. Was the National Institute of Education (NIE) investment worthwhile? No. The educational pay-off was trivial when considered in terms of total cost.
2. Should NIE sponsor other telecommunication demonstrations? The findings are inconclusive. There is a high latent demand for secondary-school educational programming.
3. How should that investment be made and controlled? Local autonomy-- by native, non-governmental organizations.
4. Is the satellite necessary for educational programming in Alaska? The answer is not clear. The satellite is one of several alternative ways of providing wide telecommunication coverage.
5. Should NIE fund further educational demonstrations in Alaska using ATS-6? No. If NIE's charter is to encourage educational experimentation, there are better ways. There was no effective involvement of village or even regional natives in the shaping of programs.

Finally, in a preview of the theses to be explored in a second year of their study (as yet unreported), PCI raised the following rather interesting and subtle points for consideration:

"One could argue that the one sure way to destroying cultural diversity is for the Government to attempt to preserve that diversity. Further, it is probable that the first step in that destruction will be to create a non-culture-- a culture existing only in the eyes of the white population and called the 'Alaska Native Culture'. Instead of having cultural diversity, Alaska will be polarized in terms of two non-existent

cultures--the 'mainland mainstream culture' and the 'Alaska Native Culture.'"¹

In a discussion of the need for secondary educational materials for video communication, PCI remarked, "Although this can be viewed as a strong argument for investing in program development rather than telecommunications, a case can be made for investing in telecommunications as a means of spawning experiments in program development."²

ALASKA INDIAN HEALTH SERVICE DEMONSTRATION

Overview

The Indian Health Service Experiment explored the feasibility of using teleconsultation as a means of improving the effectiveness of primary health care at the rural village site. Two local clinics in Alaska were linked by ATS-6 to a regional Service Unit Hospital in Tanana where doctors were available for consultation. Medical support was provided by specialists and other medical personnel in Anchorage. In-service training materials for local health aides and health-education lectures for villagers were also transmitted.

Background

The Indian Health Service is a division of the United States Public Health Service. The Alaska Area Native Health Service is the local agency for the Indian Health Service. Alaskan Natives are organized into 12 Native Regional Corporations, each having a specific ethnic and cultural identity. Each corporation appoints a Health Board for the Region. Representatives of these boards serve on the Alaska Native Health Board, which advises the Alaska Area Native Health Service.

Most Alaskan Natives live in rural, isolated communities where first-line medical care is typically provided at one-room clinics or in the homes of village health aides who are hired and trained by the Alaska Native Health Service. Health aides are guided by written orders and radio instructions from their unit hospitals.

The Alaska Native Health Board assigns the highest priority to the development of the community health-aide program and to the improvement of the communication system that provides the back-up for these aides. The health-aide program was initiated in 1968. Over 150 villages are now served by 185 trained aides. As noted earlier, land-based communication is unusually difficult in most parts of Alaska. The ATS-1 audio communication experiment provided tremendous improvement in the reliability of radio communication in the area serviced by the satellite. For example, the Tanana Service Unit contained 26 villages with satellite earth stations. There was a 400-percent increase in physician/health-aide contacts in the first year of ATS-1 transmission. Villagers regard this satellite service as an integral part of their health-care system.

Site Selection

The concerned federal and state agencies began working with the Alaska Native Health Service in 1974 to plan and implement an interfacility consultation experiment on ATS-6. The Tanana Service Unit (already an ATS-1 user) was chosen as the experimental unit. Two health clinics within the Tanana Service Unit were selected to participate in the teleconsultation service. Both clinics had permanent clinic buildings although the typical village clinic is in the home of the health aide.

Five sites were planned and equipped for this experiment. Three installations (Tanana Service Unit Hospital and two village clinics) were comprehensive sites (could receive and send both audio and video). A fourth comprehensive site was at the Alaska Native Health Center in Fairbanks and was linked to KUAC-TV facilities at the University of Alaska. Fairbanks was viewed as a back up for Tanana and it was expected that medical education and consumer health programs would be taped there for transmission to the other sites. In fact, Fairbanks did not participate in the Indian Health Service experiment. (It was used in the WAMI experiment, however).

The Alaska Native Medical Center in Anchorage was an intensive site (receive video and receive/transmit audio). Anchorage monitored all transmissions and was the coordinating site for the Indian Health Service ATS-6 experiment. The coordinator, a physician, also participated in the teleconsultations when necessary and arranged for the involvement of other specialists.

Teleconsultations

A teleconsultation required the health-care personnel at the clinic to serve as technician, cameraman, and biomedical equipment operator, as well as to play the role of health-care provider. Apparently, the nurse at one site and the health aide and physician's assistant at the other performed all of their roles well.

To protect the privacy of the patients viewed and discussed in the teleconsultations, scramblers were used when transmitting. Sites which were not equipped with descrambling equipment could not receive an intelligible signal. The system was not entirely successful, and other modes of assuring anonymity were also employed.

In a teleconsultation, the primary health-care person at the clinic presented the patient for consultation. (Aides from other villages also brought patients to the experimental sites.) The three ATS-6 audio channels which were not involved in the basic video/audio transmissions could be used to transmit biomedical data including EKG's and heart and lung sounds. In practice, however, the EKG transmission over ATS-1 proved to be time consuming and in the stethophone audio quality was poor. Consequently, most heart and lung data transmissions were carried over the primary video/audio channels. The two medical officers in Tanana asked questions and provided direction over ATS-1 audio.

Results

From September 1974 to May 1975, there were 109, one-hour consultations. A total of 245 patients were involved in 323 presentations and ten specialists were contacted.

Several aspects of the planned experiment were not effectively implemented. A computer-based patient information storage and retrieval system, located in Tuscon, Arizona, was to be tied into the teleconsultations. Complete records of a patient's medical history were to be available on call. The Health Information System failed to operate during most of the experiment, due to equipment problems, and a microfiche back-up was used instead. High priority had also been given to consumer health education and to in-service training. Health aides receive only eleven weeks of training, and it was hoped that the Indian Health Experiment would develop and transmit some educational materials for their benefit. In fact, only nine hours were devoted to educational transmissions due to the number of patients requiring medical attention. Several video-taped lectures were prepared and transmitted, and one consumer health program was presented.

The report suggests that most of the project goals were met: (1) unnecessary trips were avoided in that patients were not transported to hospitals when it was not necessary, and doctors did not make unnecessary emergency visits; (2) urgent cases were identified and transported for hospital care; (3) greater communication among the levels of health-care providers was promoted; and (4) the aides and the patients felt an increased sense of security when local diagnosis and treatment were

confirmed by the physician. The report also suggests that teleconsultations are especially effective in orthopedic cases and also in cases involving skin lesions, acute trauma, burns, cardiac conditions, and eye problems.

One drawback faced by medical care that is geared to fixed time of access, of course, is that medical emergencies do not occur on schedule and patients are not always available when transmission time is scheduled.

Apparently, the Indian Health Service is going forward with plans to use the findings of this experiment in the planning of an improved health care network for the state.

ALASKA INDIAN HEALTH SERVICE EVALUATION

The evaluation was conducted by Dennis Foote, Edwin Parker, and Heather Hudson of the Institute for Communication Research at Stanford University. Since the demonstration was an exploratory field trial and not a rigorous experiment, the evaluation had to follow this lead. A relatively small patient population was served in somewhat atypical villages, and the limitation of three hours a week schedule of broadcasting for nine months limited what could be assessed. Nevertheless, the evaluation examined technical performance, usage of the system, and effects on the attitudes of the participants. The evaluation study attempted some comparisons between the use of teleconsultations and the use of audio-only consultations conducted in the earlier ATS-1 experiments. The preceding description, based on the final report, focused only on the ATS-6 experiment.

Sources of Data and Populations

Data were obtained from logs kept at the two health-care sites, reviews of case summaries, interviews with health-care providers and members of the Satellite Review Committee, and the Health Information Service. Comparison data from ATS-1 audio consultation were gathered from logs and evaluation reports on doctor's calls from the earlier demonstration.

Most dependent variables, including usage, effect, and participant attitudes, were measured by several instruments. The data from structured interviews, attitude scale responses, and subjective observations, in addition to archival data, were analyzed and contributed to the description of the results.

The patients and the types of complaints encountered were extremely diverse. The patients came from every age bracket. Cases seen on television seemed to be slightly more complex or severe than those presented over the satellite radio. Almost 500 logs and forms were studied to see if the process of medical care in video consultation via satellite made a difference. Approximately 1700 cases were reviewed to see if the doctors involved perceived the consultations (video/audio/telephone) as having a greater or lesser effect on the patient's eventual health status. Thirty individuals were interviewed to ascertain how the users felt about the satellite demonstration activity.

General Results of the Evaluation

- Satellite video channels do provide a vehicle to consult on almost any medical problem.
- Health-care providers at all levels of training can utilize satellite video consultation successfully.
- A measured critical difference detected in this study due to the use of video transmission was minor. Only five to ten percent of the cases showed any effect due to the visual capability. The kinds of cases that were difficult to handle with audio only were also difficult to handle with video consultations.
- Health-care providers agreed that the video consultations improved the capabilities of the health-care system but questioned whether the improvement was worth the additional cost or inconvenience.
- The Health Information System (HIS) in both the microfiche and eventual computerized form was judged by participants in the demonstration to be a valuable addition.

The evaluation study was hampered by the limitation of a field trial and the need to get the job done. Changes in organizational personnel and configurations during the study must be considered when interpreting the data. A context for video consultation had been established by virtue of the work with audio consultation on the ATS-1 Satellite.

The evaluation report makes a number of additional recommendations regarding planning and use of telecommunications technology for serving the health needs of Alaskan Natives (Indians, Eskimo and Aleuts) in the region. These do not seem totally justified, solely on the basis of the procedures and data provided in the evaluation study. Discussion with the authors revealed that earlier, and parallel, cost analyses and research studies were also used in developing the recommendations.

WAMI EXPERIMENT IN REGIONALIZED MEDICAL EDUCATION

Overview

The Washington-Alaska-Montana-Idaho (WAMI) ATS-6 experiment built upon experience gained in an on-going experiment in regionalized medical education which started in 1970. The WAMI experiment focused on: (1) expanding the scope of the basic science instruction at universities providing training to first-year medical students enrolled in, but not located at, the University of Washington (UW) School of Medicine; (2) determining the usefulness of television interaction in evaluating a medical student's clinical progress, and in investigating the value of the satellite for training at clinical units located in small communities throughout the WAMI region; and (3) exploring the use of television as a substitute for face-to-face contact in the many administrative, coordination and counseling activities in a widely dispersed association of cooperating universities and community clinical sites. The UW was linked by ATS-6 to the University of Alaska (UA) and a community clinic site in Omak, a city of 4,400 in the State of Washington.

Background

The WAMI Experiment grew out of two basic problems in medical education. The first related to the increasing demand for medical education in the WAMI region and the tremendous cost of developing new medical school facilities. The UW has the only medical school in the four-state region, which comprises 22 percent of the land area of the United States but has only three percent of the population. In addition, 60% of the medical manpower in the WAMI states is located in 12 cities where about 25 percent of the population resides. The second problem was one of distribution of medical manpower, both geographically and by specialization.

The UW has long been the focus of medical training for the Northwestern states and Alaska. Tuition supplements are paid to the University by neighboring states for providing training in its five schools of health science. The demand for this service began to outstrip the facilities, and it appeared that the UW could no longer meet the medical education needs of its three closest neighbors. In an attempt to use existing resources and to avoid duplication, the UW expanded its medical campus in two ways.

Some of the UW first-year students took their basic science training,

usually the first quarter of instruction, at universities other than the UW. Instruction at the other universities was coordinated through the UW, whose faculty travelled frequently to other schools to lecture and review programs. Students then went to the UW to complete their first year of study.

Third- and fourth-year training in clinical practices was also decentralized. Six weeks of clinical training in each of the last two years was scheduled in "Community Clinical Units" scattered throughout the WAMI region. Students worked with private physicians, most of whom were located in small communities and were devoted to the practice of general or family medicine. Since doctors tend to practice in the area where they train, it was hoped that more new physicians would find the practice of medicine in the less populated communities attractive. It was also hoped that experience with general or family practice would encourage students to turn to this kind of practice themselves. Specialization requires advanced equipment and facilities. These are usually only available in urban areas and at large hospitals.

A by-product of the decentralized clinical training was also anticipated. As with most professionals, doctors thrive on interaction with their fellow physicians. Small community doctors often feel out of touch with their profession. It was hoped that the interaction with the medical school staff would provide stimulation and training to those working in relative professional isolation.

The WAMI ATS-6 experiment, which also utilized the audio capabilities of the ATS-1, built directly upon the existing WAMI program. There was a need to expand the local teaching services beyond the first-quarter basic science courses. The University of Alaska (UA), for example, wanted to extend its basic science program to a full year's training. If this was to be done, clinical specialists were essential to the expanded curriculum and were not available at most universities. Travel to the participant universities was costly and time-consuming. In addition, the UW School of Medicine saw a need to increase its monitoring and interactive capability with local physicians who were participating in the clinical training program. The ATS-6 experiment represented a vehicle for examining methods of extending the regionalized education program and for exploring the extent to which telecommunications could be used to reduce on-site visits and increase instruction and supervision.

University Phase

The university phase of the experiment (between the UW and the UA) was the only experiment in the ATS-6 series which had full, duplex capability, i.e., both audio and video could be transmitted from both sites simultaneously. This capacity came close to approximating a face-to-face exchange. Three areas of programming were defined for the university phase: curriculum, administration, and patient care. There were thirty-four, 75-minute telecasts between the UW and UA.

The objectives of the curricular experiments included determining academic effectiveness, student and faculty acceptance, interaction potential, effect on a sense of isolation of student and peripheral faculty, and feasibility of clinical demonstrations. Two types of lectures were presented by the UW; one served to enrich the basic science courses, and the other presented specialized courses of study, e.g., "Tissue Response to Injury." The UA faculty also conducted lectures to acquaint the UW faculty with problems endemic to Alaskan Natives.

A computer-aided evaluation program, transmitted over the three unused ATS-6 audio channels, was planned to parallel the lecture presentation. Wide ranging basic science courses in medicine are available by land link through a project sponsored by the Lister Hill National Center for Biomedical Communication. The network is controlled through a computer at the University of Ohio. There was no land link to these programs in Alaska, and the WAMI experiment hoped to make these courses available via the satellite link. Because of technical difficulties, and a requirement for parallel use with the television broadcasts, only three successful computer-aided sessions were conducted.

Five types of administrative conferences were held during the course of the experiment. Faculty conferences and conferences between administrators were held to see if course content and administrative decisions could be reached when decision makers were separated by considerable geographic distances. Admission conferences were held whereby candidates for admission to the UW School of Medicine were interviewed via satellite by members of the Medical School admissions committee in Seattle. Two types of counseling conferences were also conducted which focused upon opportunities available in health careers and administrative problems normally facing first-year students.

In an attempt to evaluate teleconsultations for direct patient care, a series of consultations by UW dermatologists was also conducted. Medical students observed the consultations either directly or via videotape recordings at a later time.

Community Phase

The community (or clinical) phase of the experiment involved transmissions between the UW Medical School and the Family Medical Center in Omak. The Family Medical Center is a small, private-practice group. Medical students were at the center in successive six-week periods and student residents on a rotation basis. Twenty, 75-minute segments were telecast between the UW and Omak. The community phase of the experiment also had three areas of concern.

Student case presentation required students to present their patients and discuss problems with the UW faculty. Faculty at the UW also presented programs to Omak students on patient care. Faculty on-site visits during each six-week rotation served as a control comparison for the televised interaction.

In an effort to provide a continuing education component to the community phase, Omak-based personnel prepared programs on rural health and emergency medical care. The UW reciprocated with three programs on topics of interest to several levels of health-care professionals.

An on-going medical consultation effort between psychologists at Omak and psychiatrists at the UW was included in the satellite experiment. Mental health teleconsultations were conducted, and a lecture/demonstration was transmitted to Omak. Follow-up, on-site consultations were used for comparison.

In an effort to compare the effectiveness of color versus black-and-white video transmission in medical consultation, one dermatology teleconsultation was conducted between Omak and UW. This dermatology consultation was compared with the color dermatology patient-care segment of the university phase of the experiment.

The WAMI project is moving out of the experimental phase. Developmental funding, both private and federal, is phasing out; and the states are now appropriating funds for the program's continuance. In addition, applications activities and experiments building upon the ATS-6 experiments are scheduled to be conducted on the Canadian Telecommunication Satellite experiments in 1977.

WAMI UNIVERSITY AND CLINICAL PHASE EVALUATIONS

Evaluation of the WAMI program was designed and conducted by the Office of Research in Medical Education (ORME), School of Medicine/University of Washington, supported by the Lister Hill National Center for Biomedical Communications of the National Library of Medicine.

The assessment was based upon two major phases of the WAMI experiment in Regionalized Medical Education: the University Phase Evaluation (UPE) and the Clinical Phase Evaluation (CPE). The overall objective of the two phases was similar, i.e., to ascertain if the communication technology can be useful in a decentralized medical education program. Emphasis was placed on user acceptance, technical feasibility, and interaction characteristics of the communication system. However, differences in the approach, methodology, and application of findings of the two phases warrant separate discussions.

Populations

UPE. The populations were the students, faculty, and administrative personnel at the Universities of Alaska and Washington.

CPE. The populations were Seattle-based clinical faculty and residents and Omak-based community physicians, faculty, students, residents, patients, and other health professionals. Data were also gathered from communication technicians and studio directors.

Methodology and Data Collection

In the UPE several kinds of communication were studied including broadcasts of subject matter content, admissions interviews, and administrative faculty and student counseling conferences. The evaluation attempted to assess technical feasibility, interaction characteristics of the educational program, and user acceptance of satellite versus in-person modalities.

Data were gathered through the use of post-broadcast and/or program questionnaires, direct observations, written subject-matter examinations administered to students at the completion of the coursework, interviews, and technician logs.

In the CPE the prime focus was assessment of the technical feasibility, determination if the satellite capability could substitute for on-site activities,

interaction characteristics of the educational programs, and user-acceptance related to the satellite. The researchers collected and analyzed information from over nine months of satellite and traditional communication situations. Types of communications evaluated included faculty discussions, student case presentations accompanied by faculty-student consultations, evaluation reports from continuing education programs for faculty, and consultations on patient problems.

Data were gathered from technicians' log reports, rating-scale questionnaires, subjective-response and anecdotal-evaluative questionnaires administered after broadcast, and a pre- and post-broadcast attitude survey (interview format) administered to participants. The "Bales technique" (Bales, 1950) was used to document satellite and in-person communications. *This multi-phase approach which analyzed video consultation along seven dimensions (e.g., hostile-enthusiastic, apprehensive-calm), and the assessment of the value of satellite consultation (as contrasted to face-to-face, telephone, and written communication and pre-recorded tapes) were two of the most inventive approaches to assessment in all of the satellite projects.*

Constraints

Program constraints in the UPE precluded the use of random selection of the students enrolled in the basic science courses; comparable data for in-person situations/communications were not always available, and equipment delays reduced the amount of time available for students to use computer-assisted evaluation.

All constraints noted in the CPE report were technical: the inferior quality of audio/visual transmissions from Omak compared to those from Seattle; the necessity at Omak of switching video signals according to lower quality conditions; and the necessity of using 25 telephone lines to transmit voice signals when participants were not on camera.

Results (UPE)

The following summarizes the main outcomes of the University Phase Evaluation activities:

- Interaction. An "impressive" number of interactions per minute occurred between Fairbanks and Seattle and the technology did not appear to inhibit interaction.

- Subject Matter Delivery. In one subject area, the mean of scores on tests covering content partially delivered via satellite to University of Alaska students was significantly higher ($P > .001$) than was the mean of test scores from conventionally instructed University of Washington students; in the other subject area, means were identical. Students mastered the material presented via satellite and the evaluators concluded that satellite transmissions are effective for teaching in the WAMI Program.

- Admissions Interviews. Two of four applicants interviewed both by satellite and in person were offered medical school acceptance. In two of the cases, opinions formed via satellite interview about the applicants' acceptability were reversed when these persons were interviewed in person. The additional time and more relaxed nature of the candidates in the in-person interviews provided the screening committee with more information.

- Conferences. Decisions were reached quickly and agenda items were satisfactorily handled. In fact, this mode demonstrated that administrative decisions can be made more effectively when they are not a product of in-person meetings.

- Participant Acceptance. The students had no complaint and faculty were enthusiastic about the technical quality of the satellite sessions. All students preferred to have in-person lectures, but considered the satellite an acceptable alternative.

Results (CPE)

The results of the Clinical Phase Evaluation may be summarized as follows:

- Interaction. Based on the operational definition of satellite interaction, (i.e., that satellite sessions exhibit questions, answers and elaborations) telecommunication did not alter the basic flow of interaction during activities related to the medical students' and residents' education. Most of the satellite communication can be described as giving and taking information; there was a higher proportion of giving than of taking information via satellite; and the reverse was true (i.e., more asking for than giving information) for in-person communication situations. Via-satellite communication of emotional messages, both negative and positive, were less frequent than in in-person communication situations.

The student/resident interactive experience in Omak consumed more time on site than on satellite; but more time was used for faculty education programs on satellite than on site. Some on-site activities could not be conducted via present satellite technology, e.g., hospital rounds, seeing patients with students, and community house calls.

- User Acceptance. In general, participants were positive in their feelings about the telecasts. There was a wide range in "feelings of comfort" with the system, e.g., participants were less calm with student/resident programs than with faculty education programs.

In regard to the ease of using the system, there was both a mild positive response (UW participants) and neutrality (Omak participants). Participants indicated mild agreement that a feeling of personal contact had been achieved with the use of the technology, but also indicated moderate self-consciousness in using the technology for communication. They found the equipment slightly distracting.

Use of the system for formal presentations of information and interactive discussions was rated more effective during student educational programs than during programs designed for continuing education (faculty) and consultation.

Patients were passive on satellite but participated quite actively on-site.

Assessment

The overall outcomes of both the CPE and UPE are positive and indicate the value of continued explorations and use of telecommunications for WAMI endeavors. Certain conclusions and inferences drawn from the UPE findings seem to reflect clinical judgments rather than judgments based upon both clinical and statistical data. This is understandable given both the initial technical constraints and limited populations available for this first exploration. In terms of the stated UPE objective of assessing the effectiveness of two-way interactive multiplex audio and video satellite communication for a variety of programming situations, and considering the constraints on this phase of the evaluation, a number of conclusions may warrant additional testing in future tests with larger populations and more broadcasting.

Regarding the effectiveness of the use of technology in admissions interview situations: "It should be noted that the incorrect decisions were not a function of the technology itself, but of the amount of time allotted for the given task." Consequently, it is hoped the satellite approach will be afforded "equal time" in the future and students will have "warm-up" periods on camera to put them at ease with this approach.

Similarly, the conclusion regarding administrative conferences may be suspect (see page 35) because adequate controls or comparison situations would be required to accurately assess satellite effectiveness in this situation.

Regarding the use of the satellite to broadcast subject-matter programming: "Although students were not assigned randomly to the two groups, the data suggest that students learn selected aspects of basic science material via two-way interactive color television as well as in the traditional lecture-discussion method of instruction." This statement is questionable, however, because the instrument used to test participants was a "general" examination and only part of the course content was delivered via satellite. As for the pathology content, only certain items on the instrument were common for both groups. However, it was obvious that students can learn from this approach.

Statements about the impressive number of interactions per minute in satellite communications do not appear to be supported by the data since no comparison was made to the number of interactions per minute during comparable in-person communications. In fact, certain findings from the CPE indicate that at least some participants may have been inhibited by the technology. This area requires further exploration.

The CPE, however, seems objective in terms of overall presentation (including methodology) and application of findings. In general, the CPE seems to have been better controlled and the findings and conclusions do meet the evaluation's goal of assessing the feasibility of the use of the technology.

One exception to CPE's generally straightforward presentation of findings relates to program purposes:

"The relatively low ratings on the achievement of program purposes reflects some disenchantment with the black and white and half-duplex constraints of the system."

Although this assertion may have intuitive validity, if there are supporting data for it, they are not clearly presented in the report.

Also, the statement, "It is apparent that the communication profiles on satellite are generally similar to those observed on-site," is weakened by certain exceptions in the data which suggest that, for some persons, some aspects of communication are considerably different in on-site and via-satellite situations. Again, this is an area which WAMI will want to examine in future applications involving additional populations. Comparisons based on participants' longer exposure to the technology would be helpful in strengthening or refining this conclusion, and we are certain that the experimenters would agree.

What Would Have Happened Without the Satellite?

Regarding the University Phase, the benefit of reduced travel and therefore, costs seems to have been a substantial result of using the satellite. The findings are conclusive enough to show that the ATS-6 activities were worthwhile and should be tried on a larger scale to support the regional medical program's needs.

In the CPE, the results also show the feasibility of using satellite technology in the investigated situations. Overall, the University Phase demonstrates that satellite technology can facilitate WAMI programs and related activities.

Considering the distance between sites and other geographic/demographic constraints in both the university and community phase, the technology did enable the communications to be performed with more ease -- which may be justification enough for the use of the technology, especially in terms of reduced time and resources.

Additional controlled investigation is required to demonstrate more clearly the level of effectiveness of the use of satellite technology in communications in the WAMI program. There is no question that the demonstration provided evidence that further development of this technology for a regional medical education program such as WAMI makes sense.

ROCKY MOUNTAIN EDUCATIONAL PROJECT:
SATELLITE TECHNOLOGY DEMONSTRATION

Geographic and Demographic Characteristics

The eight-state Rocky Mountain area served by the Satellite Technology Demonstration (STD) covers one fourth the total area of the United States. Its terrain includes some of the highest mountains as well as semi-arid plains and sweltering deserts. The area's population is ethnically diverse. About 39 percent of the nation's Indian population lives in the Rocky Mountain Region, mostly on 70 reservations which occupy 38 million acres. The region also contains about 30 percent of the nation's Mexican-Americans. Significant groups of Spanish-Americans, Basques, and Orientals are also residents. The percentage of Blacks is relatively small.

In spite of the low population density of the area (9.7 people per square mile) and the physical harshness of much of the land area, communications are relatively sophisticated. Most areas have access to some level of television programming and are served by radio and telephone. Roads reach even the more isolated towns, and most of the population is familiar with modern communication technology.

Overview

The Satellite Technology Demonstration transmitted programming to 68 sites in the Rocky Mountain Region. Three original programs were designed and produced: (1) a junior high school career education course; (2) an in-service, teacher-training course in career education; and (3) an adult evening series targeted for residents of isolated, rural communities. Existing films and tapes, selected as supplementary or enrichment materials, were also transmitted for recording and viewing by school audiences. The STD conducted an extensive data collection and analysis effort which assessed audience characteristics, student performance, and viewer acceptance.

Background

The final report on the STD details a history of changes in project goals and funding expectations which plagued the STD from the beginning of its negotiations with the various federal agencies supporting the satellite demonstration. Our report, however, focuses on the organization which finally

evolved in STD, the program products which were produced, and the effects of the transmissions on the target audiences.

As early as 1968 the Federation of Rocky Mountain States explored the possibilities of satellite-based communications in its region. A 1969 proposal to the Department of Health, Education, and Welfare initiated the Rocky Mountain Educational Project, and a Memorandum of Understanding, issued in June of 1973, governed the final operational phases. The demonstration ended in the summer of 1975.

The basic technological goals of the STD were: (1) to explore the feasibility of distributing educational materials to remote areas via satellite; (2) to develop an information gathering and field service system which involved cooperation among state, district, and local institutions; and (3) to assess the effectiveness of an audio system which permitted interaction between the instructional center in Denver, Colorado and peripheral sites. In addition, new courses and programs, designed to meet user needs, were developed and evaluated.

The STD served eight states including the members of the Federation of Rocky Mountain States--Colorado, Idaho, Montana, New Mexico, Utah, and Wyoming--and two non-member states--Arizona and Nevada.

Career education was selected as the major content area for the bulk of STD programming. This decision was based on federal funding agency priorities, regional interest, and local parent and teacher interest. Since a review of the career education literature indicated that the junior high school audience was the most neglected in existing materials, this group was chosen as the primary audience.

Site Selection

Site selection for the installation of antennae and associated equipment for receiving satellite transmissions was, in the end, confined to rural sites and rural-isolated sites with no adequate public television reception. (This site-selection strategy eliminated urban populations and distorted early attempts at a representative sampling of Anglos, Mexican-Americans, Native Americans, and Blacks.) Community interest in the STD, strength of local leadership, and availability of local support funds were also considered in selecting sites.

There were 68 operational sites. Twenty-four (three in each state) had the capacity to receive satellite transmissions and to transmit and receive live audio for direct interaction during educational programming. In addition to these 24 "intensive" sites, 32 sites were selected for installation of "receive-only" equipment. Finally, 12 public television stations in the eight-state region were selected to receive satellite transmissions for relay to homes in their respective viewing areas.

Project Structure

The management structure of the STD mirrored the operational requirements and consisted of: (1) an administrative section which had overall responsibility for the project's functioning--including a public information capability, and (2) a broadcasting and engineering section which coordinated the satellite equipment and transmission requirements of all ATS-6 education and health experiments. Of more interest here are the three remaining divisions, including: (3) a utilization component which coordinated the scattered field service staff of the project; (4) the research capability which evaluated the acceptance and effectiveness of the transmitted materials; and (5) a program activity which had responsibility for development and production of course content. All management sections interacted extensively throughout the project's life.

Utilization. The utilization effort coordinated the extensive field operation and data collection requirements of the STD. State coordinators (typically attached contractually to state departments of education) established and maintained liaison with legislatures, school district officials, and local community leaders. State coordinators were responsible for individual site coordination within their state. There was also direct transmission of information and materials between project headquarters in Denver and the operating sites.

This two-channel communication system (mediated and direct) seems to have worked very effectively. The local site representatives were not isolated from those who directed the project, yet they had recourse to someone with authority (the state coordinator) who was aware of local needs and conditions. The effectiveness of this communication system was further supported by researchers who indicated that data flow through direct mail was useful for certain collection procedures but that, when complete or complex data return

was essential, the mediation of the state coordinator was important.

The STD obviously made sincere and extensive efforts to establish a positive climate for the demonstration in the participant states and at the local level. Perhaps the fact that the contractor (Federation of Rocky Mountain States) was an organization committed to solving regional problems and coordinating regional efforts gave it a unique advantage.

Research. This component participated in the needs assessment activities and conducted an evaluation of all components of the STD. An external evaluation of the demonstration, conducted by the Educational Policy Research Center of the Syracuse University Research Corporation (EPRC), relied almost entirely on data collected by the STD research staff. The analysis of the data collected from all audiences, site operators, teachers, and administrators was conducted by STD and is presented in the final report.

Needs assessment was, to some extent, a component of all STD program development. The details are covered in the description of the different programming areas, which follows in the next section. In general, needs assessment was viewed as a three-tiered problem including:

1. decision makers at the federal and state levels;
2. advocates of primary users at state and local levels; and
3. primary users (students).

The report points out that before a project can concern itself with the primary users, it must determine (1) if there is interest at the decision-making level where funds are available and (2) if advocates and decision makers can be brought into agreement. They also warn against relying too heavily on primary-user responses in determining course content and suggest that the developer must differentiate between student "wants" and student "needs". Their experience prompted them to emphasize that instruments used to collect needs assessment data should be coordinated with content specialists so that the data collected will be useful to course developers.

Program Development. Roughly 60 hours of live programming were created or coordinated in the STD studios. In addition, many segments of prepackaged materials were transmitted. The program development effort suffered as much as any from schedule changes, financial cutbacks, etc. Some of the more

promising procedures, including those described here, deteriorated under the stress of production constraints. Nevertheless, at least three are worth noting.

1. A 16-step formative review process was formalized that takes the program component from initial needs assessment through development, production and review, and ends with a refined component ready for summative evaluation.
2. An interdisciplinary courseware team concept was developed. This program development team included a writer, content specialists, and a director experienced in both education and television, who led the team. The courseware teams were served by a resource pool which included a printed media specialist, additional content specialists, script writers, and a reference materials specialist. The pool also coordinated input from research, utilization, and broadcasting and engineering.
3. An internal review panel was established which helped to identify the causes of low acceptance in pretested programs and which substituted for the primary review audience when time would not permit further testing. The panel included administrative, field, content, and production personnel. Review panel and audience ratings (when both were available) tended to agree.

Summary of Programs and Results

The following programs were developed, produced and transmitted by STD:

1. an in-service, teacher-training course called "Careers and the Classroom: A New Perspective for Teachers;"
2. an adult interest series, called "Footprints," designed for rural audiences;
3. a "Materials Distribution Service" which made existing educational films and tapes available to participating sites via satellite; and
4. an extensive career-education course for junior high school students called "Time Out."

"Careers and the Classroom" was designed as a training adjunct to the "Time Out" series and also as a demonstration of the feasibility of presenting teacher training via satellite. Teachers and administrators at intensive and receive-only sites were exposed to 16 programs over 32 weeks. The field

service staff arranged for college credit or recertification for those teachers taking the program as a required course.

In each program a moderator introduced a panel of guest experts who each spoke on the topic for 10 to 30 minutes. The balance of the 55-minute period was devoted to an interaction (question and answer) session between the panel participants and teachers at the intensive sites. Receive-only sites observed the interaction.

Results of a user acceptance survey indicate that teachers who attended the classes as volunteers generally gave higher ratings to the program than did those who were required or expected to attend. The majority of the attendance, however, was motivated by college credit or recertification requirements. Teacher ratings also indicated that, of the four program components (moderator, presenter, format, and interaction), the presenter component was most accepted while the interaction component was least appealing though still positively rated. Teacher ratings of the 16 programs (topics) in the series yielded ambiguous results. For example, one program which was rated highly in terms of "stimulation for future school action, classroom utility, and interest" was ranked tenth in terms of "helpfulness" and was judged only eleventh best of the 16. No data on classroom performance or test results, if any tests were given, are reported. However, 554 educators received college credit from local institutions for the course, and 322 received recertification credit from state departments of education.

The adult, evening "Footprints" series consisted of ten, 50-minute programs on subjects ranging from consumer guidance to cultural heritage. Formal and informal community surveys contributed to the selection of topics. The typical program format involved a pre-recorded exposition of the topic followed by brief comments from expert panel members. Live interaction (at intensive sites) between viewers and panel members concluded the program.

A directory of programs and program participants was distributed to each site, and public information efforts, including Spanish-language flyers, attempted to bring adults to the evening series. The total viewing audience of "Footprints" at the STD sites was 2,932 members, including

repeat viewers. Attendance patterns were no doubt influenced as much by local events (ranging from basketball games to snow), holiday periods, and competing commercial television presentations as they were by program topics. Data on viewing patterns of the home audience for the public television presentations of "Footprints" support this conclusion.

As the series progressed, the number of new viewers declined. Overall, 63 percent of the viewers saw at least three programs. Eighty percent of the audience indicated that they would like to see the series continued. A sample of public television viewers who reported having seen a "Footprints" program indicated that these home viewers watched an average of 6.47 of the ten programs in the series. The results suggest that the programs were of sufficient interest to attract repeat viewers although overall attendance was disappointing.

Participants at both intensive and receive-only sites judged the "Footprints" programs and the interaction component to be "helpful." However, viewers at intensive sites, where interaction was participatory rather than observed, found both the programs and the interaction component more "pleasant" than viewers at receive-only sites. No differences were found between the acceptance ratings of male and female viewers, and roughly the same number of males and females viewed the programs. There were no consistent differences in the reported acceptance ratings based on the ethnic/cultural background of the participants. In almost all cases, more participants judged the programs and the audio interaction component as "helpful" than judged them as "pleasant." Viewers who travelled further to see the programs appeared to be most positively disposed to their continuation and to their helpfulness.

The Materials Distribution Service (MDS) established a library of films and video tapes for transmission to participating sites. The library included 400 titles leased from Encyclopaedia Britannica Educational Corporation and the Great Plains National Instructional Television Library. Initial selection of titles for the MDS library was made by teachers at the sites. Selections were tabulated and ranked. The suppliers reviewed the resulting list and eliminated programs which they felt might be inappropriate. The remaining programs became the MDS library.

An MDS catalog and a program guide were provided. The catalog listed the titles alphabetically and by subject area. Entries included film length, approximate grade level, and a content summary. The program guide included producer information about the titles and suggested appropriate educational applications for each film or tape. An order form was sent every six weeks to the 56 sites. Teachers indicated choices, and the forms were tabulated and used to develop MDS broadcast schedules.

Of all the components of the STD, the MDS was rated most positively by teachers. They saw the content as appropriate and felt the catalogs and guides led to effective program selections. There was an average of 87 showings per site during the school year. Over 190,000 students saw showings and recordings of MDS titles. Equipment limitations at the STD sites represented the major drawback to the service. Most sites had only one video tape recorder, one monitor, and a limited tape stock; MDS showings could not be stored indefinitely because of blank tape shortages. Other sites purchased sufficient tape to retain the full library throughout the demonstration year.

Royalty and copyright problems must be faced in a transmit/record project of this kind. Agreements with publishers for permission to record and store tapes of broadcasts expired at the end of the project. A long-term project would, no doubt, have serious problems getting publisher permission to transmit commercially available tapes to a large number of sites. Also, it should be noted that, in spite of the high acceptance and extensive use of the films, the MDS is no more than a space-age vehicle for transmitting conventional and already accessible materials which are familiar in format, if not in content, to all teachers.

The "Time Out" career education series was designed for junior high school students and focused on three categories of behavior:

1. Self-assessment, including needs, aptitudes, interests, and skills;
2. Career exploration, including information about career areas, educational requirements, personal options, and social, cultural, and geographical influences on employment; and
3. Decision making, including decision-making strategies, educational alternatives, and the student's role as a decision maker.

These categories grew out of meetings with educators and career experts on the regional level. The experts suggested 103 goal statements for a career-education course. Initial content structuring led to a listing of 28 career concepts which were reviewed by regional and local educators. These concepts were organized into the three behavior categories noted above.

A sample of 2,578 adolescents from communities in each of the participating states was asked about their interest in different kinds of work, attitudes toward different occupations, knowledge of occupational possibilities, and personal preferences toward reading materials, music, and free-time activities. These data were used to generate appropriate program content and television formats for the series.

"Time Out" programs were designed around a futuristic setting called Time Control Central. A spiral approach was used in organizing topics into programs. The spiral insured that major topics would be treated more than once and that topics would build upon one another. Existing materials were reviewed, and those selected were incorporated into the overall programming. Sixty-nine preproduced programs were developed. The earlier programs were field tested and subsequent programs were altered on the basis of the results. Content revisions were based almost exclusively on user (or review panel) acceptance rather than performance data and were not extensive.

In addition to the preproduced programs, a six-minute "Time In" interaction section was scheduled at the end of each day's broadcast. A series of twelve, 30-minute interaction programs ("Time For You") were scheduled on Fridays.

Printed materials supplemented the television programming. A student magazine was distributed to each student four times a semester. It contained program logs and suggested daily activities. It was designed to promote student acceptance of the course and included puzzles and games and also highlighted students in the program who were involved in career-related activities. A teacher's guide, which was produced and updated monthly, pointed out potential career education resources in the community and suggested classroom activities and discussions. Since a large portion of the audience viewed "Time Out" through "open sites" (public television transmissions), arrangements were made for the purchase of printed

materials for students reached through those sites.

The fall semester of the demonstration year was used as a "formative" evaluation semester for the "Time Out" series. First-semester students consistently preferred the "Time Out" programs over the interactive "Time In" and "Time For You" segments and the student magazine component. In general, first-semester students at intensive sites described the contribution of the interaction system more positively than did those at receive-only sites.

First-semester student scores on the criterion-referenced (course specific) "Time Out" Test showed modest gains (seven percent) over pre-test scores on a 27-item test. In addition to the "Time Out" Test, the Attitude Scale of the Career Motivation Inventory (CMI) was administered at the beginning and the end of the first semester. Small gains were noted. The "Time Out" Test was revised on the basis of first-semester results. Items found to have significant pre- to post-test gain were selected for the "Time Out" Test given to second-semester students.

For the second-semester evaluation, two groups of schools were added to the data pool--the open sites and the comparison sites (junior high schools not receiving any STD materials). As previously noted, the data collection and analysis for this final (summative) evaluation were conducted and reported by STD research personnel.

The majority of the students consistently reported that they would like to see the career-education class continued. The "Time Out" programs were the most widely accepted of the program components although the student magazine received high ratings on "Interest."

Students were asked to assess the course in terms of: (1) comparison to a regular classroom, (2) information, (3) helpfulness, and (4) interest. Students at intensive sites consistently rated the course higher than students at open sites. Thirteen-year-olds rated the course higher than 15-year-olds. No consistent patterns of course acceptance based on the sex of the student were shown. Eighth graders liked the class most, while tenth graders liked it least. Grade achievement level (in contrast to actual grade in school) was not a consistent predictor of course acceptance. Mexican Americans and American Indian students showed high acceptance levels, while

Anglos consistently expressed the lowest acceptance levels. A relationship between teacher acceptance and student acceptance was demonstrated.

In general, teachers and administrators at all levels demonstrated acceptance attitudes consistent with the extent of their involvement in STD programs or decision-making processes--the greater the involvement, the higher the acceptance level.

Students at intensive, receive-only, and open sites showed consistent, if modest, improvement on the "Time Out" Test and on the Career Motivation Inventory. No such improvement was shown at comparison sites. Students at intensive sites may have shown consistently better test performance than those at receive-only and open sites. This finding, however, is not clearly supported by the data presented. In general, scores on the "Time Out" criterion-referenced test were most affected by student characteristics, although the sex of the student and actual achievement level did not contribute significantly to the variance in test scores. Scores on the CMI tests were not consistently affected by any student characteristic.

Although acceptance levels were generally higher for students who participated in the first-semester course than for those who participated in the second semester, test scores showed some gains in the second semester. These differences may be attributable to changes in the "Time Out" Test, changes in the content of the course based on the formative evaluation, or other uncontrolled conditions.

It has already been noted that gains on test scores were modest, although consistent. If the only purpose of the demonstration were to test the educational content of the materials rather than the feasibility of their use and the level of their acceptance, these minimal performance gains might be disturbing.

EXTERNAL EVALUATION OF THE SATELLITE TECHNOLOGY DEMONSTRATION

The external evaluation of the Satellite Technology Demonstration was conducted by the Educational Policy Research Center (EPRC) of the Syracuse University Research Corporation. The evaluation is based primarily on the considerable amount of data collected by the STD during the operation of the demonstration. The EPRC also had open access to the STD files and interviewed central project staff as well as some state and site personnel. They also established a "local advisory panel" of 44 teachers and administrators who had been involved in the demonstration and surveyed their reactions through questionnaires. *There is every reason to believe that the STD results, on which the bulk of the EPRC conclusions are based, were carefully collected. It must be noted, however, that EPRC apparently did not have broad personal contact with the sites or the audiences served. Their conclusions must be viewed in that light.*

Caveat

EPRC seemed to concur in the STD staff conclusion that the extreme frustration experienced as a result of changing federal guidelines had a significant impact on the demonstration. They made no attempt to assign fault but did point out the importance of reaching an early consensus on specific objectives and general goals. There was an obvious mismatch between funding agency and Federation of Rocky Mountain States expectations for the demonstration. EPRC concluded that, though some disparity of goals can be tolerated in a large-scale study of this kind, the disparity in this case was disabling to the effectiveness of the early activities of the STD.

Perhaps as an example of these difficulties, EPRC reported that funding and production delays precluded the testing of about half of the "Time Out" programs. The STD's commitment to the schools required that all programs be reviewed prior to broadcast. In effect, the first semester of "Time Out" was a student "review."

In general, the EPRC report supported the statistical conclusions presented in the STD final report and summarized in the previous section of this document. One aspect of the program did produce comments, however.

Peripheral equipment (e.g., monitors and video-tape recorders) required minor repairs although satellite-related equipment was extremely reliable.

The following summary of the evaluation focuses on those areas where EPRC's interpretation of the results differed from that reported by STD. The evaluation also raises some questions not explored by the STD report.

"Time Out"

EPRC remarked, as we did, that the absolute gains in learning shown by the "Time Out" students were small. The STD was not, as it turns out, under contractual commitment to assess learning gains. The tests were administered at the insistence of the participating schools. The report also pointed out that, although the STD analysis of results was extremely competent, there was no way to measure the impact of the novelty of participation in a satellite program on either the learning gains or the user-acceptance measures which were reported.

A reluctance to accept the reports of intensive-site "superiority" was also noted. Investigations indicate that intensive sites received added attention both from STD and from other interested spectators. This was more coincidence than design--a by-product of the additional equipment requirements of the intensive sites and the public and professional interest in witnessing interaction via satellite. This fact, more so than the equipment differences, may well have resulted in the contrasts reported between intensive and receive-only sites.

A review of the project files and of questionnaire responses led EPRC to conclude that the "Time Out" course, though well received, was not ideally suited to the schools that used it. It was perceived by teachers as "too much of a good thing." Local advisory panel responses demonstrated a concern that far too much dependence on TV and a lack of classroom interaction would result if future programs were to follow a similar format. A future course based largely on television programs with satellite interaction was least preferred by the panel, while a system similar to the Materials Distribution Service was most acceptable.

STD interviews with participants at the end of the demonstration supported this observation. "Time Out" was viewed as too long and too often.

Participants said that they would re-use "Time Out" but would select only certain programs and supplement the course with local activities.

A real concern was expressed by the teachers and staff for the role of the teacher in future satellite programs. The question was also raised as to whether a user-supported system of the future would pay for the comprehensive programming developed for "Time Out." The need was seen for enrichment programs rather than mediated instruction. This consideration was viewed as especially important if courses in more established disciplines (e.g., math or social studies) were developed.

"Careers for the Classroom"

The EPRC discussion of this course presented very little that has not already been covered in this report. It was noted, however, that contacts with colleges granting credit for course participation indicated that the interaction capability was not a factor in their acceptance of the course. Also, colleges typically allow no more than six hours credit toward advanced degrees for courses of this kind. (In other words, the granting of credit for several courses of this kind would require policy changes on the part of the colleges.) The colleges were generally satisfied with the quality and content of the program.

"Footprints"

The EPRC evaluation viewed the "Footprints" series as a failure in that it did not attract and hold an adult audience. The programs themselves were of high quality and were well received by those who attended. The fact is, however, that high early attendance figures dropped substantially, and the mean site attendance per program was slightly over five persons. Median attendance was no more than two persons indicating that some sites contributed most of the audience. No explanation was advanced as to why attendance declined. The EPRC questioned STD's satisfaction with repeat attendance figures, suggesting that the high percentage of repeat viewers in the audience simply indicated that total attendance was falling off.

A review of STD files indicated that the staff felt a short, four or five program series targeted for specific audiences would have been more effective. The results of a series of emergency medical programs, geared for firemen, policemen, etc., were very positive. (The series was not

discussed in the final report.) EPRC and STD staff both concluded that perhaps special interest programs coordinated with existing organizations would be more successful.

EPRC suggested that the ineffectiveness of "Footprints" in reaching isolated audiences supported a conclusion that such satellite programs are not effective where there is no organizational support (e.g., schools) and where the audience is not captive (e.g., students and teachers). The lack of local institutional support in isolated areas was seen by many as one of the rationales for implementing a satellite communication system. EPRC suggested that unless institutional support is available, the communication system may not succeed in attracting audiences.

Materials Distribution Service

The EPRC study confirmed the appeal of the Materials Distribution Service programming to teachers. User criticism of the MDS format was primarily associated with scheduling. MDS transmission occurred during school hours and, in some sites, there was a problem when classes were held in the STD equipped room. In a future implementation of such a system, materials could be broadcast at any time and recorded automatically by video-tape recorder. In general, NASA's insistence on real-time viewing and no reruns of STD programs presented serious problems from the schools' point of view. The rationale for this was based upon a desire by NASA to assess the impact of one-time viewing.

MDS did involve equipment purchases by participating schools. Video-tape recorders and tapes were not provided by STD. Many schools were extremely unhappy when they learned that their file of recordings could not be kept after the experimental year. Even the arrangement for schools to keep tapes by paying one third of the catalog price to the publisher represented a financial burden for some schools. EPRC suggested that a MDS-type service may be a real possibility in later user-supported satellite communication systems. It would attract a large audience, it could be expanded without elaborate equipment, and it has no intrinsic fixed-time viewing requirements. Coordination of the selection of materials for transmission and the problems of coming to agreements with publishers and producers were seen as potential difficulties.

The real-time viewing of STD programming presented a serious scheduling problem for most schools. They felt that "the whole school revolved around

STD." School activities had to be rescheduled to avoid interference, and class schedules were reorganized. These problems would no doubt be compounded if more than one course were broadcast. Schools in the entire area would have to operate on the same schedule. The interaction component of satellite transmission is the primary argument for real-time viewing. Without the interaction mode, transmission could be recorded for viewing at a convenient time.

Interaction

The interaction capability was the most glamorous aspect of the demonstration. Roughly one third of the demonstration class time was devoted to the various uses of this mode. The STD staff reported that there was no effective effort to study or evaluate various uses for interaction. It is clear that EPRC did not feel that either the effectiveness or the necessity for an interaction mode was demonstrated by STD. EPRC raised a question which it, admittedly, could not answer satisfactorily: "If there is to be a teacher in the classroom, why is it desirable that interaction take place via satellite, rather than within the classroom, between teacher and students?"³

The evaluation dwelt on the difficulties in predicting costs, the loss of flexibility in viewing schedules, and the limited possibility for audience participation due to only one microphone in the classroom. It was suggested, however, that if interaction served as a substitute for an expensive, on-site instructor, the mode might be seen as more productive.

Field Support

The external evaluation report confirmed the overall effectiveness of the STD field support system. EPRC focused on the potential costs of a similar support system in an expanded, permanent satellite communication system and suggested that a first step toward a test of user willingness to pay might be made with an MDS-type service. The cost is relatively low, and the appeal is high. If users are not willing to budget funds for this kind of service, there is no reason to believe that they would pay for more expensive formats that are (at least in this demonstration) less popular.

EPRC concluded that at this time there is no real sense of the user's willingness to pay for any satellite service. School budgets are tight, and there is no reason to believe that this will change in the near future. Willingness to pay for the service will, no doubt, be directly

related to the need for the program and the availability of a substitute.

The Future

According to EPRC, STD has been unsuccessful in its quest for funds for additional work in satellite communications. The Public Service Satellite Consortium, an organization which STD helped to establish, now has a federal grant and over 80 members. EPRC felt that STD's conclusion (assumption) that state and local user support for a satellite system would materialize was not supported by the results.

Conclusions and Final Recommendations

The STD final report recommended that the government should establish a public service communication system dedicated solely to the use of health, education, and social services. It concluded that once established, this permanent service could be financially supported and sustained by the people who use it. EPRC felt that this conclusion went beyond the evidence. A summary of EPRC's recommendations and conclusions follows:

1. A satellite distribution system for educational programs is technically feasible.
2. User acceptance was high but one cannot conclude that this indicates a willingness to pay for such services.
3. The Materials Distribution Service was the most promising educational application.
4. Planners should exercise caution with any system based only on fixed-time transmission. Large audiences cannot be attracted under the constraints of real-time viewing.
5. Two-way communication was not viewed as either essential or economical.
6. Successful products must be linked closely to their compatibility with existing organizational structures. STD demonstrated a dependence on such institutions.
7. Local acceptance and use is dependent on liaison staff at regional and state levels.
8. STD attempted to create a user-based system of programs within the constraints of funding, time, etc. The project did not demonstrate, however, the ability of paying users to arrive at a consensus on desired services or the extent to which a satellite system with a central decision-making function could respond to these needs. EPRC saw this area as having high priority in future experiments.

Although the EPRC conclusions and recommendations were, in general, supported by STD results, they seemed to us to be somewhat shallow. Interaction, which admittedly was not creatively explored as an instructional technique, was written off as of little interest in future systems. A more productive use of their knowledge of STD and satellite capabilities might have led to some insight into how interaction might be used to significant advantage in the future. Their reservations about user willingness-to-pay were based on assumptions that the school system is, by definition, static, and that educational pay-off in terms of significant learning gains or reduced training costs could not occur as the programming methodology begins to catch up with the equipment technology. EPRC seemed disposed to view the programming failures of STD as predictors of the future failure of creative, well-designed programming when, in fact, the STD viewed program content as secondary to the technological features of the system.

EPRC perceived itself as engaged in federal policy analysis for educational R & D and did not collect as extensive independent data as might normally be the case when conducting a project evaluation. A second portion of the assessment dealt with developing a scenario of methods for delivering instructional television, via satellite, cable, public television, mailed videotapes, and microwave broadcasting.

APPALACHIAN EDUCATION SATELLITE PROJECT

Background

The Appalachian Regional Commission (ARC), the sponsoring agency of the Appalachian Education Satellite Project (AESP), was formed in 1965 in an effort to solve the common problems of communities in a 13-state region on the Eastern seaboard of the United States. In 1973 the ARC was funded to participate in the Health/Education Technology satellite demonstration and, subsequently, satellite ground stations, mostly at rural schools, were installed in eight Appalachian states. The distance between the northernmost AESP site in New York and the southernmost in Alabama was approximately 700 miles, so the components of the 15-station ground system were geographically isolated from the transmission studio in Lexington, Kentucky, and from the rest of the participants in the HET demonstration across the country. The University of Kentucky at Lexington served as the Resource Coordinating Center for the AESP.

Most of the 48 counties from which the teachers who participated in the AESP came were below average in per-capita income and were classified below the poverty level by U.S. standards. The ARC identified a great many educational needs in the region and stated that the immediate objective of the AESP was to improve the effectiveness of the classroom teacher, thereby upgrading the quality of reading and career-education instruction available to Appalachian students. Specifically, the AESP planned to explore the feasibility and effectiveness of satellite-delivered education to meet these special problems. The design of the AESP is of further interest in that it required interstate cooperation, which is difficult to achieve. Three of the five clusters of ground stations contained sites located in more than one state. The interstate cooperation was between teachers at the local level, and the AESP did not directly involve the state departments of education. Fourteen institutions of higher education, each unrelated to the others by political organizational structure, granted or accepted academic credit for the participating teachers.

As the AESP pointed out in their Final Report, for the first time in the region, a major group of diverse educational institutions (diverse both geographically and philosophically) were cooperating in order to offer educational services to the widely dispersed residents of the region.

Needs Assessment and the Audience

The selection of subject matter to be presented during the AESP was based upon an assessment of needs resulting from a two-year educational survey of Appalachia completed shortly before the advent of the satellite project. The study indicated a need on the part of teachers in the lower grades of the school system (kindergarten through sixth) for course work leading to reading improvement, specifically, the recognition of student deficiencies. A parallel need was indicated by the teachers of all grades through high school for information about career education. With the selection of reading and career education as two of the more pressing needs in education, the assessment of teachers' needs was continued by the AESP throughout the production of the program materials. The instructors in both subject matter areas maintained contact with their audiences through a system of feedback which permitted the teachers to evaluate the content and the developers to adapt "the content of the on-going course more toward the expressed needs of the participants." The producers of the material for the reading programs referred to an assessment of field needs made in educational publications of the ARC relating to this subject and to published articles on Appalachian children. The reading courses were modeled after the New York State Department of Education In-Service Reading Program developed for a similar audience.

The course outlines in reading and the production scripts were also reviewed by teachers and other educators in the region before production began.

Participants in the programs at the local sites were selected by advisory councils organized through the Regional Educational Service Agencies (RESAs) participating in the AESP. (The RESA's served cooperating school districts, schools, and communities and had significant local educational and service responsibilities apart from participation in AESP.) Participants were recruited from among teachers at schools close enough to one of the ground terminals to permit attendance at the satellite sessions which were conducted once a week for each of the courses. The courses were held over the period of a school semester (16 weeks), qualifying the participating teachers for graduate-level credit at one of the cooperating institutions of higher education.

The Courses

Reading. An in-service teacher training course for teachers of grades

one through six, with certain course differences for grades one through three and four through six, was developed. Seventeen, half-hour video tapes and associated materials were produced. Eight live interaction seminars were transmitted, and four-channel narrative audio programs were prepared for most video taped programs. (The four-channel programs were essentially audio, multiple-choice, four- or five-item quizzes which provided immediate correction or confirmation of choices. No video was associated with these 15-minute segments.)

Apparently one of the most popular aspects of this program was the filming of exemplary field teachers as part of the video taped presentation. The use of associated reading materials, to set the stage for the program topics and to reinforce the content, was also recommended.

Approximately 600 teachers took some form of the reading course. The formative evaluation component provided data about teaching and administrative conditions in the target regions, developed data collection formats for site visits and feedback from teacher observations, helped establish behavioral objectives for the course, developed techniques for rating drafts of course scripts, provided experimental data on the effectiveness of different methodologies, and prepared all participants in the experiment for the evaluation activities coincident with the course.

Career Education Course. This in-service career education program was viewed by about 250 teachers of children in grades one through six. Twelve, one-half hour video tapes were prepared, and five live video seminars were conducted. Supporting materials were developed. The video tapes included interviews with people who might relate to the elementary student's concept of the world of work as well as location filming of career education classrooms. The evaluation component contributed to the development of this course in much the same way it did in the reading course. It verified the contextual as well as the formal features of pre- and post-test items with subject matter and test construction experts. It also provided a summary of current economic conditions which contributed to the relevance of the course content.

Career Education Seminars. The career education seminars reached about 250 teachers of students in grades seven through twelve. [Originally two courses (7-9 and 10-12) were planned for teachers of this age group. A shift in

priorities, based on feedback from educators in the field, resulted in the expansion of the reading teacher-training program already described (to include grades four through six) and the two career education courses for secondary school teachers were combined.] The secondary career education course involved 16 live seminars. Although all 16 seminars were outlined before the course presentation began, subsequent programs were modified as weekly audio feedback sessions helped define the needs of the participants.

Ancillary, on-site laboratory activities were also developed and students were requested to plan and develop a curriculum/implementation unit.

The seminar/panel format of this course was not viewed as completely successful. Course developers and participants felt that "how-to-do-it" materials and filmed segments of teaching situations should heavily augment the seminar format.

Information Retrieval Systems. Various attempts were made by AESP to develop information and materials access and retrieval systems for teachers in the experimental courses. Since none of these specifically required satellite transmission, they will not be discussed here. Readers who are interested in a review of these activities are referred to the Final Report and the reports of the evaluation component of the project. Twelve technical reports were developed and include formative evaluation, equipment transmission and reception performance, and cost estimation models. Six summative evaluation reports on the in-service instruction are also included in the technical report series.

Internal Summative Evaluation

The majority of evaluation activity took place in concert with the in-service offerings provided during the summer and fall of 1974. There were 291 participants in the Diagnostic and Prescriptive Reading Instruction (DPRI) for K-3 teachers; 246 in the Career Education course for elementary school teachers (CEE); and 248 in the Career Education course for secondary teachers (CES).

When asked to compare ATS-6 activities to similar on-campus activities, the teachers felt that they received as much information, or more, from the satellite instructional activities. This included the pretaped TV programs, live interactive seminars, laboratory exercises, audio reviews, and

information retrieval systems.

Did the participants learn from the instruction? In all three areas the participants brought considerable prior knowledge to the instruction. Pre-test scores indicated that in the DPRI, CEE, and CES approximately 60% of the content of test items was known. In spite of this, gains were recorded that indicated the knowledge level had been raised significantly, as recorded on the post-tests. The participants seem to show modest improvement in attitude toward the overall approach after completing the instruction. Also, teachers did apply what they had learned to their classroom activities.

In the Spring of 1975 a second course in diagnostic and prescriptive reading (DPRI) was offered to approximately 300 teachers. It was designed to offer teachers individual experiences in diagnosing children's specific reading problems and locating materials to remedy these problems. Again, achievement gains were significant, and a slight improvement in attitude toward the approach was noted -- although this had been high at the outset.

Taped TV programs, the on-site reference materials, and the seminar hosts and guests were highly rated. The television programs which contained a balance of theory and practice were rated highest. Earlier results had shown that site representatives who are not content experts can administer these courses successfully. This assessment suggested a number of ways to strengthen the site representatives' role.

EVALUATION OF THE APPALACHIAN EDUCATIONAL SATELLITE PROJECT

The external evaluation of the Appalachian Education Satellite Project was conducted by the Educational Policy Research Center (EPRC) of the Syracuse University Research Corporation. EPRC did not conduct any formal data collection or analysis of the project. AESP had an internal evaluation component and, apparently, EPRC did not find any specific disagreement with the results reported by that group. Any new information collected by EPRC resulted from visits to six classrooms during class meetings and from conversations with 67 persons who had participated directly or indirectly in AESP. Apparently the interviews (visits) were unstructured and no attempt was made to analyze the content of the conversations.

EPRC devoted considerable discussion to the organizational context of AESP. They were particularly interested in the reversed role which they felt the Appalachian Regional Commission found itself taking in this project. Instead of serving as the vehicle of the associated states in seeking federal support for regional or state projects, ARC was used by federal agencies to distribute funds to independent agencies (e.g., Regional Educational Service Agencies (RESA) and universities and colleges). EPRC suggested that important, concerned state agencies were by-passed in this arrangement. *An ARC response to this conclusion suggested that EPRC may have underestimated the participation of state agencies and personnel in the shaping of AESP policies and goals. No matter which view is more accurate, the point raised is an interesting one. Any cost-effective satellite distribution system, of necessity, involves coordination across a large delivery area. Whether the coordination takes place among states, countries, or cultural/ethnic organizations, the role of the institution that mediates between the central coordinating activity and the audience to be served may well be the locus of success or failure. If the states did play a secondary role in the AESP, it is unlikely that they would continue to do so in a long-term educational satellite project.*

The University of Kentucky's role as Resource Coordinating Center (RCC) also received special comment. EPRC noted that the University of Kentucky already had strong commitments to teacher training and academic service as well as competence in the development of course materials for

electronic transmission. The University's role in AESP represented an extension of its existing mandate to serve. AESP also expanded the role of the RESA's. EPRC concluded that AESP's organizational effectiveness was due to the fact that existing institutions were permitted to expand and innovate. New, competing organizations were not established.

EPRC did not question the basic findings of the internal evaluation or the successful overall performance of the AESP. EPRC, however, qualified its satisfaction with AESP in a number of ways. The most cogent comments are summarized here.

1. The role of the RESA-AESP coordinators was seen as critical-- not because they contributed to the content of the courses, but because they sustained the environment in which the instruction took place. Although no data are presented, EPRC concludes that coordinator attitudes elicited very different reactions in the participants at the different RESA's.
2. Although the learning gains and acceptance data presented by AESP are not questioned, EPRC pointed out that it is impossible to assess the effect of novelty and wide, positive institutional support for the project on the behavior of teachers taking the training.
3. EPRC expressed concern about the limited scope of live interaction in this demonstration. Since questions were screened in the studio, EPRC questioned whether "live" interaction actually took place at all. Whatever interaction did occur, however, was not judged to have been a major contributor to the educational results.
4. There was some question about whether the computer-based information retrieval system was either accepted or extensively used by the participants. EPRC concluded that this system did not contribute to the outcomes of the project. EPRC did, however, suggest that future satellite-based systems should explore means of providing access to a computer-based retrieval system.

This brief report on the external evaluation has attempted to touch on some of the points made by EPRC which seem to be of broader interest. A number of other comments and recommendations were included in the report.

An interesting letter from Harold Morse, Director of Education of AESP, is included at the end of the EPRC evaluation report. It represented, in part, AESP's response to a draft of the report and clearly indicates that the project personnel had serious differences regarding the procedures and findings of the evaluation group. It is hard not to agree with Morse's assessment of the EPRC report. EPRC presents no raw, structured data and seems to take the position that AESP was completely successful in meeting its goals in spite of the fact that none of the accomplishments were exclusively a result of the satellite technology. EPRC found very little to criticize in the Appalachia project but goes to great lengths to describe what might have gone wrong if something, in fact, had. In this context the EPRC evaluation may be useful to future planners.

VETERANS ADMINISTRATION EXPERIMENTS IN HEALTH COMMUNICATIONS ON ATS-6

Background

The Veterans Administration (VA) comprises the largest health care delivery system in the Western world. It includes 171 hospitals and 212 out-patient clinics, many of which are located in geographically isolated areas of the United States. Size and geography have created complexity and isolation, the two greatest challenges confronting the VA in its continuing effort to provide patients with high-quality medical care. Reaching the system's remote hospitals using traditional methods of communication is costly and difficult. Thus, communication by satellite was highly useful to the VA in overcoming the educational and clinical inequities within the vast system.

Legislation in 1966 (Public Law 89-785, which includes the Exchange of Medical Information Act) provided the impetus for the VA to begin looking at new communications technology which could serve to reduce complexity and isolation within the VA health-care system. Specifically, the legislation provided for innovative projects that would link remote VA hospitals to VA installations located in urban centers and to major medical centers. The VA selected ten hospitals located in the Appalachian "footprint" for its experiments. NASA's ATS-6 provided the means for two-way access and avoided the problem and expense of laying thousands of miles of ground lines. It also avoided the problems inherent in trying to establish terrestrial microwave linkages in a region inhospitable to such a plan. Furthermore, using ATS-6 on an experimental basis would permit the testing of the application of a new technology before making a larger monetary investment.

Overview

During the period from July 10, 1974 to May 19, 1975, 69 programs, divided among five types of experimental designs, were broadcast to ten VA hospitals in the Appalachian Region over ATS-6. Each hospital was provided with a telephone linkage to a Denver television studio where programs originated, so that two-way communication was possible during all broadcasts. The question addressed in this study was as follows: Are the capabilities of communications satellites sufficiently unique, diverse, and cost-effective, as compared with traditional carriers of electronic messages, to warrant participation by the VA in future ventures using more permanent communications

satellites?

The experiment was conducted in three stages:

Stage I -- Organization and Needs Assessment
(June 1, 1973 - February 14, 1974)

Stage II -- Preproduction (February 15, 1974 - June 30, 1974)

Stage III -- Implementation (July 1, 1974 - May 20, 1975)

Formative evaluation was undertaken during each stage and summative evaluation followed the completion of Stage III.

During Stage I principals brought together the resources required for the experiments and conducted a needs assessment to determine the subjects of each program to be televised during the satellite broadcasts. In Stage II programming decisions were made transforming the list of user-generated subjects into scheduled broadcasts divided among four experimental events. The implementation stage of the experiment began on July 10, 1974, with the first broadcast to the ten hospitals.

Audience

The goal of the VA/ATS-6 experiment was to test many kinds of communications with various types of audiences. Therefore, many narrow target programs were included in the broadcast schedules, along with programs intended for more general audiences. The audience range extended from patients and their families to the physician-specialist interested in new diagnostic techniques.

Needs Assessment

An informed needs assessment was undertaken among the physician, nursing, and evaluation coordinators at the ten participating hospitals to determine tentative subjects for programs. Results of the "first-wave" generated hundreds of topics which were arranged in order of frequency listed. The 100 most frequently mentioned topics were evaluated in a "second-wave" for refinement. Eighty-nine topics were generated and returned to evaluation coordinators in the ten participating hospitals for recommendations from physicians, nurses, and other appropriate practitioners as to the specific information to be covered on each program topic.

Program Content

The VA experiments were based on two general communications require-

ments: (1) the need for access to specialists for consultations; and (2) the need for continuing education that incorporated learner participation.

Based on formative evaluation data, five types of experiments or "events" were designed for trial on ATS-6 and included: (1) video seminars, (2) grand rounds, (3) out-patient clinics, (4) teleconsultations, and (5) computerized events. The five types of experimental events served various objectives.

Video seminars presented didactic material using videotapes and short films interspersed with two-way discussions between faculty in the studio and participants in the ten VA hospitals. Printed study guides were sent out in advance to supplement the program broadcast. Video seminars were evaluated in terms of (1) knowledge gain, (2) attitude and behavioral change by viewer participants, and (3) patient-care outcomes.

Grand rounds presented patient case studies using visual materials, such as laboratory findings, when appropriate. The initial plan to use live broadcasts was prevented by loss of satellite frequencies. Instead, the goal of these presentations became that of simulating institutional rounds. No study guides accompanied these broadcasts. Evaluation was based on technical success, i.e., the ability to simulate grand rounds and broadcast them over the satellite and at the same time to maintain high production quality.

Out-patient clinics presented information to patients on the treatment and rehabilitation of their own diseases. The format of these programs followed that of the video seminars, i.e., a preproduced film or videotape, discussion by faculty coordinators and panelists, and an opportunity for patient viewers to ask questions. Programs were evaluated in terms of their success in changing patient behavior and attitudes and in terms of the knowledge gained.

Teleconsultations originated in-hospital. The objective was to answer specific, technical questions of Appalachian physicians and other specialists. Videotaping began one week in advance of the broadcast. On the day of broadcast, consultants viewed the tape at the studios in Denver, the transmission site for all teleconsultations. Following the videotape, they discussed the case in terms of diagnosis and case management.

The originating hospital participated with the Denver consultants in a live discussion; the other nine hospitals were invited to contribute if they wished. A special feature of the teleconsultations was the slow-scan method of sending visual information from the hospitals to the Denver studio on the day of broadcast. This is a less-expensive method of transmitting video, but does not provide the high quality picture of conventional transmission. Evaluation was based on engineering objectives as well as on attitude change objectives for physicians and nurses in the participating hospitals.

Results

Summative evaluation data show that the program broadcasts were highly regarded by hospital users. Perhaps the most significant indication of the potential use of satellite communications throughout the VA system was participant response following project termination. When a final telephone survey was taken, coordinators asked when broadcasts would begin again. Several wanted to know whether their hospitals would receive programs on the "next satellite."

Over the broadcast period, the programs (with the exception of the ten teleconsultations) continued to attract about the same number of participants in the various hospitals. Professionals continued to attend weekly broadcasts long after novelty was no longer a factor. Nurses were the most frequent and regular attendees.

The video seminars were the most frequent type of program (38) and the best attended. Attendance averaged about 400 per program, about 40 per hospital. For each of the 17 grand rounds, attendance averaged about 182. Although hampered by technological problems, the teleconsultations were enthusiastically received by physicians and consultants. The average attendance for the ten events was 158. The three out-patient clinics had the highest average attendance (226).

Summary

The computerized events which were primarily engineering experiments were hampered by technical difficulties. Applied Communications Research, the Stanford University-based group performing the formative and summative research, drew the following conclusions about the VA experiments:

1. The experiment, as a whole, had a significant impact on the experimental hospitals.
2. This impact spread to other hospitals via videotapes of individual

events.

3. The major impact was the creation of a *gestalt* which facilitated increased information seeking, improved morale, and created an environment which encouraged innovation.
4. Nurses seemed more receptive to the programming than did physicians.
5. Video seminars were the most popular form of event, although out-patient clinics might have been first had more **been presented**. (Only three out-patient clinics were presented and this was insufficient for complete evaluation.)
6. Although the grand rounds format also has great potential, it would probably be better if the events originated at hospitals rather than from a central location.
7. Satellite-mediated teleconsultation also appears to have great potential. Unfortunately, the ten events used to test teleconsultation potential were limited by the available technology (only one-way video was available), and the presentations were more in the nature of grand rounds than one-to-one teleconsultations.
8. Reactions to the slow-scan technology were mixed. Color would have helped, but many consultants felt picture transmission was too slow and interfered with the consultation.
9. The use of videotaped events was extremely widespread and effectively increased the use of other event material.
10. Although videotapes of the events were used extensively, the live quality of broadcasts, combined with the interaction, was the aspect of the experiment that contributed to the "gestalt" the experiment created.
11. The mixed viewing of the events (physicians, nurses, and allied health personnel in a common room) was a significant contributor to the *gestalt* created by the experiment.

EVALUATION OF THE VETERANS ADMINISTRATION EXPERIMENTS

This evaluation was divided into two aspects -- programs designed for delivery to groups and those designed for delivery to individuals. The evaluation was conducted by Applied Communications Research of Palo Alto, California.

The group events were evaluated using a combination of data including direct observations, interviews, and audience reactions. Data in the latter category were collected immediately after each broadcast and two to three months following the broadcast. A pre-experiment, four-page questionnaire was administered to collect baseline data. A four-page post-experiment questionnaire was administered, and responses from 302 individuals (including physicians, nurses, hospital administrators, and others) were analyzed in the evaluation report. There is no indication that before and after impressions were compared. One-page questionnaires were administered after each program and following the broadcasting of 10 to 18 programs. Site visits and consultant and participant evaluation responses were also utilized in assessing the impact of the total experiment.

Two of the clearest outcomes of the evaluation were that nurses seemed more receptive to the programming than did physicians and that video seminars were the most popular form of event. The evaluators presented a strong brief indicating that the major impact was the creation of a gestalt which increased information seeking, improved morale, and created an environment which aided innovation.

The evaluators claim that a climate was created in which it was possible to effect changes, not only in medical care practices and techniques but also in staff attitudes. Live video, "integrated" group viewing by physicians, nurses, and staff, and the positive effect of participating in an experiment at one of ten hospitals were cited as contributing to this "impact." The degree to which this impact was observed at a given hospital was reported as being directly related to the effort and support put into the experiment at each locale.

The evaluators also developed support for knowledge gains that pertain to the acquisition of nutrition information (adding to the general store of information "on call" but not applicable to any specific situation).

The strategies utilized in the evaluation were developed in concert with the project team. Although the general direction of the results appeared positive, the magnitude of any changes due to the experiment was not clear.

As with other satellite studies, the experiment was more of a field-trial of a number of approaches to using the satellite capabilities than a controlled experiment. The video tapes were so popular that they found their way into other VA hospitals which had been selected to serve as controls for measurement of knowledge gains. The tapes were also utilized in a number of informal ways in the broadcast hospitals, thus making it difficult to assess number of viewings by each individual.

The inadequacy of sampling procedures and the difficulties of administering questionnaires, interviews, etc. in a common time frame were noted by the evaluators and recognized as adding to the difficulty of assessing impact.

The evaluation would seem to support a general conclusion that the experiment did have a positive impact in delivery to groups but virtually no impact on those activities designed for delivery to individuals. The evaluators claimed that the two-way factors were significant to the acceptance and general regard for the service, but they did not provide levels of significance or a strong brief supported by the data collected.

FOOTNOTES

- 1 Practical Concepts, Incorporated. Implications of the Alaska Education Satellite Communications Demonstration for Technological and Educational Policymakers: First Annual Report; Volume I; Analysis of the Demonstration, I-2.
- 2 Ibid., I-26.
- 3 Educational Policy Research Center. Annual Report: The Education Satellite Communications Demonstration, IV-45.

BIBLIOGRAPHY

- "Applications Technology Satellite-6 (ATS-6)." NASA Facts, NF-53/1-75. Washington, D.C.: National Aeronautics and Space Administration, U.S. Government Printing Office, O-571-839, 1975.
- Ausness, C. & Bowling, B. An Experiment in Educational Technology: An Overview of the Appalachian Education Satellite Project. (Appalachian Education Satellite Project Technical Report #2). Lexington, Kentucky: RCC Evaluation Component, University of Kentucky, March, 1974 (Revised August, 1974).
- Bales, R.F. Interaction Process Analysis. Cambridge: Addison-Wesley, 1950.
- Bramble, W.J., Ausness, C. & Freeman, J.R. Performance of AESP Transmission/Reception Equipment: Summer and Fall, 1974. (Appalachian Education Satellite Project Technical Report #5). Lexington, Kentucky: RCC Evaluation Component, University of Kentucky, July, 1975.
- Bramble, W.J., Ausness, C., Harding, L. & Wetter, R. AESP Data Base Information: Rationale, Data Collection Procedure, Interpretation of Results. (Appalachian Education Satellite Project Technical Report #1). Lexington, Kentucky: RCC Evaluation Component, University of Kentucky, Winter, 1973.
- Bramble, W.J., Ausness, C. & Marion, R. Education on the Beam: A Progress Report on the Appalachian Education Satellite Project. Paper presented at the 1975 American Educational Research Association Symposium on Major Communications Satellite Demonstration for Education, Health and Technology in Washington, D.C., April, 1975.
- Bramble, W.J., Ausness, C. & Mertens, D. Cost Estimation Model for Alternative Formats and Delivery Modes. (Appalachian Education Satellite Project Technical Report #10). Lexington, Kentucky: RCC Evaluation Component, University of Kentucky, September, 1975.
- Bramble, W.J., Ausness, C. & Wetter, R. Formative Evaluation Study for AESP Diagnostic and Prescriptive Reading Course. (Appalachian Education Satellite Project Technical Report #3). Lexington, Kentucky: RCC Evaluation Component, University of Kentucky, October, 1974.
- Bramble, W.J., Ausness, C., Wetter, R. & Harding, L. The Evaluation Design: Summer Courses, 1974. (Appalachian Education Satellite Project Technical Report #4). Lexington, Kentucky: RCC Evaluation Component, University of Kentucky, December, 1974.
- Bramble, W.J., Marion, R. & Ausness, C. Student Achievement: Diagnostic and Prescriptive Reading Instruction, Summer, 1974. (Appalachian Education Satellite Project Technical Report #8). Lexington, Kentucky: RCC Evaluation Component, University of Kentucky, August, 1975.
- Bramble, W.J., Maynard, D.T. & Marion, R. Summative Evaluation of Diagnostic and Prescriptive Reading Instruction K-6 Course, Spring, 1975. (Appalachian Education Satellite Project Technical Report #12). Lexington, Kentucky: RCC Evaluation Component, University of Kentucky, September, 1975.

- Caldwell, K.S. The Veterans Administration Experiments in Health Communications on the Applications Technology Satellite (ATS-6): Final Report. Washington, D.C.: Veterans Administration, February, 1976.
- Connolly, A.J. & Anderson, F. The Contribution of an Internal Review Panel to the Development of Educational Programming (Technical Report #0213). Denver, Colorado: Satellite Technology Demonstration, Federation of Rocky Mountain States, Inc.
- Connolly, A.J. & Dale, J.B. Determining User Needs as a Basis for the Educational Programming of Large-Scale Projects (Technical Report #0211). Denver, Colorado: Satellite Technology Demonstration, Federation of Rocky Mountain States, Inc.
- Connolly, A.J., Dale, J.B., Hart, R. & Zelman, W. The Process of Planning and Designing Research for an Educational Telecommunications Effort (Technical Report #0209). Denver, Colorado: Satellite Technology Demonstration, Federation of Rocky Mountain States, Inc.
- Connolly, A.J., Dale, J.B. & McWilliams, A.E.Jr. The Formative Process Used by the Satellite Technology Demonstration in the Development of Television Programming for Junior High School Students (Technical Report #0210). Denver, Colorado: Satellite Technology Demonstration, Federation of Rocky Mountain States, Inc., 1975.
- Connolly, A.J. & Lonsdale, H.C. Program Formats, Vehicles, and Characters for Junior High School Audiences (Technical Report #0509). Denver, Colorado: Satellite Technology Demonstration, Federation of Rocky Mountain States, Inc.
- Cowlan, B. and Foote, D. A Case Study of the ATS-6 Health, Education and Telecommunications Projects. Office of Education and Human Resources, Bureau of Technical Assistance, Agency for International Development, August, 1975.
- Darby, K. Programming as an Instrument for Community Involvement: Designing Topical Television Programs for Rural Adult Audiences (Technical Report #0503). Denver, Colorado: Satellite Technology Demonstration, Federation of Rocky Mountain States, Inc.
- Dohner, C.W., Cullen, T.J. & Zinser, E.A. ATS-6 Satellite Evaluation: The Final Report of the Communications Satellite Demonstration in the WAMI Decentralized Medical Education Program at the University of Washington (Lister Hill National Center for Biomedical Communication, National Library of Medicine, No. N01-LM-4-4734). Office of Research in Medical Education, School of Medicine, University of Washington, Seattle, Washington, September, 1975.
- Educational Policy Research Center. The Education Satellite Communications Demonstration: Annual Report. (SRC# TR 75-652). Syracuse University Research Corporation, December 10, 1975.
- Educational Policy Research Center. Instructional Television: A Comparative Study of Satellites and Other Delivery Systems: Final Report. (SRC# TR 76-596). Syracuse University Research Corporation, November, 1976.

- Filep, R.T., Wedemeyer, D.J. & Ballard, J.P. Communication Satellites and Social Services: Focus on Users and Evaluations, An Annotated Bibliography. Los Angeles, California: The Annenberg School of Communications and The Learning Systems Center, University of Southern California, November, 1975.
- Foote, D., Parker, E. & Hudson, H. Telemedicine in Alaska: The ATS-6 Satellite Biomedical Demonstration: Final Report of the Evaluation of the ATS-6 Biomedical Demonstration in Alaska (Lister Hill National Center for Biomedical Communication, National Library of Medicine, No. N01-LM-3-4734). Stanford University: Institute for Communication Research, February, 1976.
- Hageboeck, M. Implications of the Alaska Education Satellite Communications Demonstration for Technological and Educational Policymakers: First Annual Report; Volume I: Analysis of the Demonstration. (NIE No. C-74-0148). Washington, D.C.: Practical Concepts, Incorporated for National Institute of Education, November, 1975.
- Harding, L., Bramble, W.J. & Marion, R. User Ratings of Instructional Activities: Elementary Career Education, Summer, 1974. (Appalachian Education Satellite Project Technical Report #7). Lexington, Kentucky: RCC Evaluation Component, University of Kentucky, July, 1975.
- Kreimer, O. Health Care and Satellite Radio Communication in Village Alaska: A Compendium of the Final Report of the ATS-1 Biomedical Satellite Experiment Evaluation (Lister Hill National Center for Biomedical Communication). Stanford University: Institute for Communication Research, July, 1974.
- Law, G. Satellite Technology Demonstration: Executive Report. Denver, Colorado: Satellite Technology Demonstration, Federation of Rocky Mountain States, Inc. September, 1975.
- Law, G. Satellite Technology Demonstration: Final Report. Denver, Colorado: Satellite Technology Demonstration, Federation of Rocky Mountain States, Inc., October 15, 1975.
- Linder, G. & Lonsdale, H.C. The Use of Courseware Teams for Achieving Content Objectives in Television Production (Technical Report #0505). Denver, Colorado: Satellite Technology Demonstration, Federation of Rocky Mountain States, Inc.
- Lonsdale, H.C. & McWilliams, A.E.Jr. Developing and Implementing a Content Structure for Educational Television Programming in the Area of Career Education (Technical Report #0506). Satellite Technology Demonstration, Federation of Rocky Mountain States, Inc.
- Lonsdale, H.C. & O'Neill, D.W. Developing Printed Supplementary Materials to Accompany Satellite Programming for Junior High School Students (Technical Report #508). Satellite Technology Demonstration, Federation of Rocky Mountain States, Inc.
- Marion, R., Bramble, W.J., & Ausness, C. Student Achievement: Career Education in the Elementary School, Summer, 1974. (Appalachian Education Satellite Project Technical Report #9). Lexington, Kentucky: RCC Evaluation Component, University of Kentucky, August, 1975.

- Marion, R., Bramble, W.J., Wetter, R. & Whitton, C. User Ratings of Instructional Activities: Diagnostic and Prescriptive Reading Instruction, Summer, 1974. (Appalachian Education Satellite Project Technical Report #6). Lexington, Kentucky: RCC Evaluation Component, University of Kentucky, July, 1975.
- Maynard, D., Marion, R. & Bramble, W.J. Summative Evaluation of Career Education in the Secondary School Course--Fall, 1974. (Appalachian Education Satellite Project Technical Report #11). Lexington, Kentucky: RCC Evaluation Component, University of Kentucky, September, 1975.
- Mertens, D.M. & Bramble, W.J. Results of Appalachian Education Satellite Project Needs Assessment Conferences (Appalachian Education Satellite Project Technical Report #14). Lexington, Kentucky: RCC Evaluation Component, University of Kentucky, June, 1976.
- Mertens, D.M. & Bramble, W.J. Review of the Literature: Appalachian Needs in Five Programming Areas (Appalachian Education Satellite Project Technical Report #13). Lexington, Kentucky: RCC Evaluation Component, University of Kentucky, June, 1976.
- Morse, H.E. The Appalachian Education Satellite Project Final Report. Appalachian Education Satellite Project Information Series, N.D.
- Office of Telecommunications, Office of the Governor of the State of Alaska. Alaska Education Experiment Final Report: Volume I. Alaska ATS-6 Health/Education Telecommunications Experiment, September 30, 1975.
- Office of Telecommunications, Office of the Governor of the State of Alaska. Alaska Education Experiment Final Report: Volume II, Appendices A - E. Alaska ATS-6 Health/Education Telecommunications Experiment, September 30, 1975.
- Office of Telecommunications, Office of the Governor of the State of Alaska. Alaska Education Experiment Final Report: Volume III, Appendices F - J. Alaska ATS-6 Health/Education Telecommunications Experiment, September 30, 1975.
- Office of Telecommunications, Office of the Governor of the State of Alaska. Alaska Education Experiment Final Report: Executive Summary. Alaska ATS-6 Health/Education Telecommunications Experiment, September 30, 1975.
- Office of Telecommunications Policy, DHEW and Office of Public Affairs, NASA. Health-Education Telecommunications Experiment Demonstration. Washington, D.C.: Department of Health, Education and Welfare and National Aeronautics and Space Administration, September 24, 1974.
- Polcyn, K.A. An Educator's Guide to Communication Satellite Technology. Washington, D.C.: Information Center on Instructional Technology, September, 1973.
- Practical Concepts, Incorporated. Implications of the Alaska Education Satellite Communications Demonstration for Technological and Educational Policymakers: First Annual Report; Volume II: Supporting Materials. (NIE No. C-74-0148). Washington, D.C.: Practical Concepts, Incorporated for National Institute of Education, November, 1975.

Practical Concepts, Incorporated. Implications of the Alaska Education Satellite Communications Demonstration for Telecommunications and Education Policymakers: Executive Summary and Supplement (NIE No. C-74-0148). Washington, D.C.: Practical Concepts, Incorporated for National Institute of Education, January, 1976.

Smith, M.P. & Sosey, P. An Historical Overview of the Production Requirement for the Satellite Technology Demonstration (Technical Report #0504). Denver, Colorado: Satellite Technology Demonstration, Federation of Rocky Mountain States, Inc.

University of Washington Project Office, ATS-6 Health Experiment Management and Technical Operations. ATS-6 Health Experiment: Indian Health Service: Alaska WAMI Experiment in Regionalized Medical Education: Seattle, Washington: Phase I: Planning and Development. Seattle: University of Washington, December, 1974.

University of Washington Project Office, ATS-6 Health Experiment Management and Technical Operations. ATS-6 Health Experiment: Indian Health Service: Alaska WAMI Experiment in Regionalized Medical Education: Seattle, Washington: Phase II: Operations. Seattle: University of Washington, December, 1975.

SUMMARY OF RECOMMENDATIONS

I. SATELLITE TELEVISION AND THE MEDIA REQUIREMENTS OF RURAL ALASKA

A. Criteria for Investment in Satellite Television

RECOMMENDATIONS	BASIS IN ESCD EXPERIENCE
1. Undertake telecommunications demonstrations in rural Alaska only when there are resources and commitment for putting aspects of the demonstrations which users deem successful directly into operations.	Rural Alaskans resent being given access to satellite television, only to have it taken away. Since effective demonstrations require enthusiastic participation on the part of users, demonstrations perceived by rural Alaskans as temporary are not a good investment of taxpayers' money.
2. Undertake satellite television operations only when they can be justified on the basis of cost-effective, timely access to programming.	Satellite television cannot be justified on the basis of real time viewing, live video programming, or live interaction incorporated with video programming. The remaining function performed by <u>satellite television</u> is access to programming.

B. Mandatory Components of a Satellite Television System

RECOMMENDATIONS	BASIS IN ESCD EXPERIENCE
1. Television sets must be placed in <u>village community centers</u> as well as village schools.	Placing sets solely in the schools makes many potential adult viewers uncomfortable, can give schools actual if not legal control over village television, and therefore goes against the current trend of giving Natives control over operations which effect them.
2. Television programming for rural Alaska must be accompanied by resources and explicit instructions for <u>video-taping</u> and watching at the villages' convenience.	Both inside and outside the classroom, the value of flexible scheduling exceeds the value of real time viewing. Television which attracts the highest participation and disrupts life the least in the villages must allow customized scheduling for each village and classroom.

C. Complements to a Satellite Television System

RECOMMENDATIONS	BASIS IN ESCD EXPERIENCE
1. As a complement to satellite communications, <u>regional media networks</u> must be developed to meet the demand for region-specific programming.	Region-specific demand has several sources: Varying ideas on how much television is good for rural Alaska; Interest in regional topics and issues; Native Language broadcasting; Regionalization of school systems.
2. As soon as there is satellite telephone, <u>audio interaction</u> should be used <u>without video programming</u> .	ESCD users have innovative ideas for audio interaction use. For the cost of telephone calls, the following will be possible: phone-in conversation radio programs; conference calls to hold meetings; audio management of media services; and education materials distribution.

II. HOW CAN CONTROL OF ALASKA'S RURAL MEDIA BE DELIVERED TO THE VILLAGES?

A. Subsidize the Development of Alaskan Native Programming Capability

RECOMMENDATIONS	BASIS IN ESCD EXPERIENCE
1. To give Alaskan Natives <u>direct participation</u> in programming, the appropriate investments are in regional and local media networks and programming.	Programming by and for Native Alaskans is a high leverage investment in cultural pride and awareness. However, at present there are very few Native Alaskan media professionals. Regional networks would provide more low level jobs for moving Natives in and up in the media than would the same coverage via satellite, and they would require less slick professionalism. It seems probable that satellite television would inhibit development of regional networks, but that regional networks would stimulate healthy growth of satellite programming if regional networks precede the satellite system.

B. Subsidize the Purchase of Programming by ESCD Consumer Committees

RECOMMENDATIONS	BASIS IN ESCD PROGRAMMING
1. ESCD Consumer Committees (including Utilization Aides) should be given funds for buying programming on behalf of rural Alaskan villages. Purchase of programming should be made on the basis of samples submitted by potential programmers in competitive bid fashion. Teachers should participate in the Consumer Committee as advisors on children's programming.	Under the ESCD arrangement, Consumer Committees only advise programmers, and represent only token control. They do, however, represent a valuable investment in consumer education which must be capitalized on. The only way to give villagers control over rural media is to give them real approval/veto power, which means purchasing power. Teachers as advisors is appropriate since Consumer Committees represent the teachers' constituents, i.e., the parents of the children they teach.

C. Subsidize the Hiring and Training of Village Media Managers

RECOMMENDATIONS	BASIS IN ESCD PROGRAMMING
1. Give each rural Alaskan village funds for the hiring and training of a Media Manager. The Media Managers must be employees of the villages, not of the State Government.	Whoever has media access to rural Alaskan villages has a virtual monopoly. Therefore, there must be the analogue to the knobs on our radios and televisions for whole villages. ESCD experience with Utilization Aides has shown that Media Managers must perform duties in the following areas: tell programmers what media services villagers like and do not like, and constantly keep villagers aware of what media services are available; coordinate viewing of adult programs and activities for children during adult programs; provide leadership, especially if the television set is in the school; collect and report local news for media transmission; organize visits by television film crews;

III. TELEVISION PROGRAMMING FOR RURAL ALASKA

A. Strategies for Allocating Programming Resources

RECOMMENDATIONS	BASIS IN ESCD EXPERIENCE
1. Commitment to broadcast material and commitment of resources to <u>new programming must be separate decisions</u> . The commitment to new programming must be preceded by a survey of available programming	ESCD user reaction to programs which overlapped with existing available programs, and to programs which filled a curriculum need were quite different. Obviously, there is no sense funding new programming when satisfactory material already exists.
2. If " <u>culturally relevant</u> " programming is the objective, then the appropriate investment is in training Alaskan Native media professionals.	ESCD programming and production staff was overwhelmingly white, and cultural relevance was not seen by users as a salient characteristic of the children's programming. The important dimensions of Alaskan Native cultures are social and behavioral, and therefore subtle. It would seem easier to teach programming to people who know the subtleties than vice versa.

B. Specific Areas for Future Programming

RECOMMENDATIONS	BASIS IN ESCD EXPERIENCE
1. Telecommunications in rural Alaska should take as its mandate: solution to the "high school problem." Three alternatives for <u>augmenting village high school curriculum</u> are: materials distribution of already existing programming; teacher-sharing via audio presentations and supervised interaction; new programming on Alaskan Native History.	Sending rural Alaskans away from their villages to high school has tragic consequences. Therefore, village high schools are being established. However, villages have neither the expertise nor the educational materials available to deliver full high school education. Alaskan Native History is an area where high school students might use audio interaction to develop their own programming.
2. Government officials and other people who effect the lives of rural Alaskans should be interviewed for <u>television transmission in a village setting</u> , in front of a village audience which asks questions and speaks up when they do not understand. (Media Managers must take a leadership role here.)	Using the current Alaska Native Magazine format, white administrators and city Natives do not talk so village audiences can understand. Perhaps a solution is for the speaker to see, hear, and feel how an audience like the one he is addressing via television reacts.

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